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By

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SANTO DOMINGO TYPE SECTIONS AND FOSSILS

PART I : MOLLUSCA

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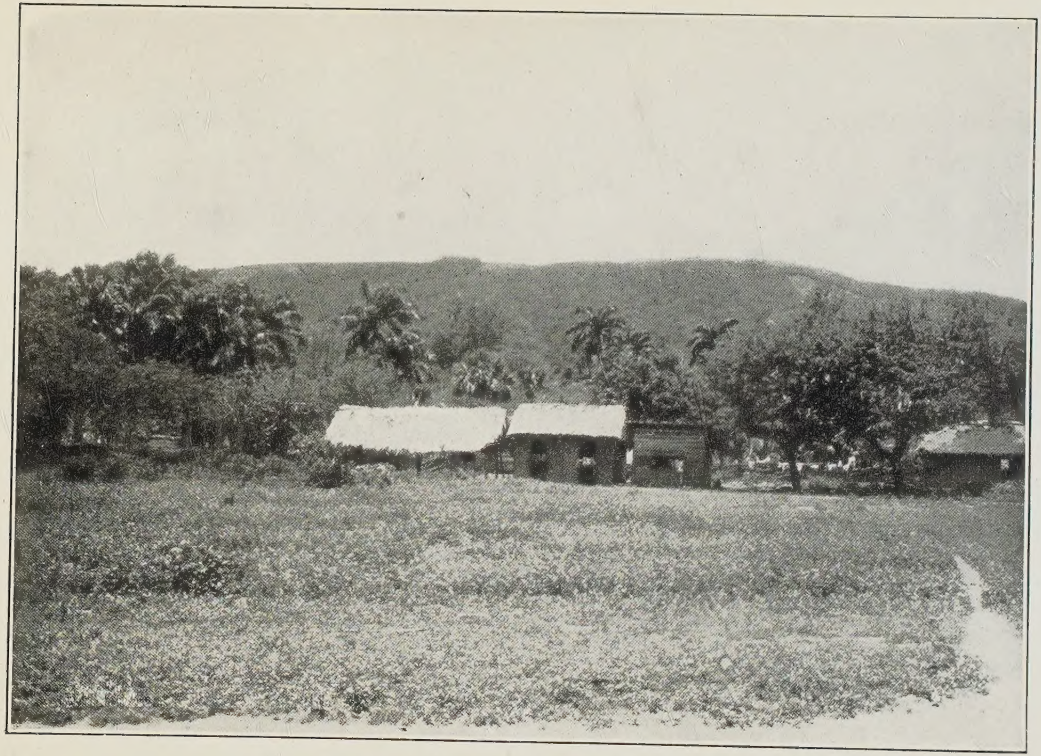
Errata for Bulletin 29

PAGE	LINE	
5	15	For "*malo*" read "*mala gente.*"
8	4	For "*mucho malo*" read "*mucha mala.*"
57	18	Genus *Clava* accidentally misplaced.
83	36	For "*proævoideus*" read "*præovoideus.*"
98	11	For "*Neustrasenoræ*" read "*Nuestrasenoræ.*"
117	28	For "n. sp." read "n. var."
123	11	Insert "*Localities.*—Bluff 3, Cercado; Zone D, Rio Gurabo."
129	24	Insert "*Turritella planigyrata* Guppy."
132	1	Add "n. sp."
133	16	Add "H. C. Lea."
133	26	Insert "Plate 33, Figure 4."
144	33	For "*semicanaliculatas*" read "*semicanaliculata.*"
146	26	Add "n. sp."
167	11	For "analogue" read "analogy."
173	8	For "Zone A" read "Zone H."
200	22	For "*riocamica*" read "*riocanica.*"
211	12	For "*Trigonicardia*" read "*Trigoniocardia.*"
217	2	Insert "Plate 37, Figure 3."
221	21	For "*islahisapaniolæ*" read "*islahispaniolæ.*"

Volume plate numbering might well be added to Bulletin plate numbering under Explanation of Plates, pp. 236-251.



Cercado de Mao and Samba Hills

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SANTO DOMINGO TYPE SECTIONS AND FOSSILS

PART I

MOLLUSCA

INTRODUCTION

The Expedition to Santo Domingo and the results embodied in this memoir were carried on under the auspices of the Sarah Berliner Foundation. This generous gift for the furtherance of women's work in science was made by Mr. Émile Berliner of Washington, in memory of his mother, Mrs. Sarah Berliner, a woman of strikingly strong and noble personality. A grant from this fund has made possible the resumption of paleontological work in Santo Domingo after an interval of more than forty years.

Additional financial assistance was received through contributions from the Veatch Fund for paleontological research. This rendered it possible to send an extra assistant and thus to carry on the field operations with far greater safety and efficiency.

The object of the expedition was to make careful zonal collections of fossils at the various sections visited and to correlate these sections with one another. With these determinations made, a much needed light would be thrown on the general sequence of Tertiary formations in the Western Hemisphere.

In addition to more than three hundred species of fossil Mollusca with exact localities, illustrated by photographs and sections, the collections secured by this Expedition included fossil Crustacea, Echinoderms, Corals, Bryozoa, Foraminifera, and plant remains; also several hundred species of recent land and marine Molluscs from Turks Island and Santo Domingo; some interesting living river crabs and other Crustaceans, and various Reptiles, including a new species of snake and some curious lizards.

The fossil Crustacea, Echinoids, Corals, Bryozoa, and Foraminifera were sent to Dr. Vaughan to be submitted for identification to experts in the different groups. He himself very kindly undertook the corals, Miss Rathbun the Crustacea, Dr. Jackson the Echinoids, Messrs. Bassler and Canu the Bryozoa, and Dr. Cushman the Foraminifera. In return for this kindness the material was loaned to the United States Geological Survey for incorporation in various forthcoming reports.

Thus it will be seen that the Expedition has contributed new and interesting material for many lines of research.

Our collection of Molluscs was supplemented by a loan of unnamed Santo Domingo specimens from the American Museum. This gave an additional locality for correlation.

Of greatest value in making the identifications was the Gabb collection of the Paleontological Museum, Cornell University, which included a large number of metatypes.

The order followed in this memoir is that in which the work was actually done. The material was collected and very critically examined and classified. In accordance with this, Part I will be devoted to Mollusca, Part II to Stratigraphic Deductions made from the study of the various classes of organic remains.

The author is grateful to Dr. Dall for his aid in certain perplexing identifications; to Dr. Vaughan for his personal interest in the corals and for the distribution for study of the various groups of fossils among his colleagues and assistants; to Dr. Reeds for the loan of the American Museum collection; to Professor Berry for identifying the plants; and to Professor Harris, who has been a never failing inspiration and mainstay.

For greatly facilitating the progress of the Expedition the writer is much indebted to the kindness of Mr. Arthur Sewall, Hon. W. A. Maury, Professor Grabau, and Ambassador W. W. Russell.

SKETCH OF THE EXPEDITION

Personnel.—The expedition consisted of the writer, Mr. Karl Paterson Schmidt of the American Museum, and Mr. Axel Olsson, Instructor at Cornell University. Mr. Schmidt and Mr. Olsson had the great advantage of having been trained in geological field work by Professor Gilbert D. Harris, having spent three summers in exploring and collecting on rivers of the Southern States, flowing through Tertiary formations not unlike those which were to be explored in Santo Domingo.

All the heavy and arduous work of collecting was done by Mr. Schmidt and Mr. Olsson. This involved wading up rivers, carrying heavy packs of fossils, sleeping in the roughest shanties, and undergoing the greatest discomforts, some not unmixed with danger to health and life, but none causing them to falter in the slightest degree. Highest praise and sincerest thanks are offered to Mr. Schmidt and Mr. Olsson for their splendid work in securing the fossils and sections upon which the results of this work are based.

Route.—The expedition left Monte Cristi on May 9th, 1916, after one day's study on the Morro. It was not possible to proceed through Guayubin on the main road, as that town was rebel. So the party crossed the Yaqui River directly south of Monte Cristi on the ferry and went to Las Aguas (see sketch map, I), thence to a region called Macabon (2 on sketch map), which lies in a very flat area. So far the trip had been over the Yaqui flood plain, consisting of alluvial deposits cut by the meandering, abandoned channels of tributary streams. Heavy rain at Macabon caused a delay of twenty-four hours, as the water lay six to eight inches deep on the flat plain.

From Macabon the party proceeded to Las Matas (3 on sketch map). The land here becomes rolling and is strewn with reddish gravels. Riding on to Escalantes (4 on map) *Ostrea* and casts of *Pectunculus* were found in the roadway near a small creek. The second night was spent at Escalantes and five hours ride the next day took the party to Sabaneta. All the way from Las Matas to Sabaneta is over the reddish gravels.

On approaching Sabaneta (5 on map) one sees the level, grassy savannahs. These, like those of Venezuela, have never been cleared and are natural meadows. Near by the grass is seen to be short and poor, although in the distance the plains look very green. The savannahs are diversified by little knolls rising from them, covered with bushes. These knolls have *superficially* the appearance of morainal hills. The savannahs are of different levels, in some cases this difference being approximately fifty feet. Those of the savannahs which are close to streams are deeply cut by dry arroyos and are left often standing as blocks. The summits are grassy, but the slopes covered with bushes. The town of Sabaneta is built on one of the large savannahs on the banks of the Rio Yaguajal and its altitude is approximately 325 feet.

A day and a half were spent studying the bluffs along the river at Sabaneta, but they were found to be unfossiliferous.

A search was then undertaken to find Rompino, one of Heneken's localities where more than sixty years ago he had collected fossils. This proved a difficult and very unsatisfactory quest, as the present Rompino is a regional name. These regions are quite common, their limits are indefinite, and their existence often indicated only by a *pulperia* (little village store) or a shack. On crossing the end of the Samba Hills on the road from Guayubin to Sabaneta a fossiliferous cut was observed in the roadside, the fossils in place being of the *Arca ponderosa* type, while further along the road the large *Arca patricia* occurred loose, not *in situ.*

Martin Garcia (6 on the map) is not well placed on Gabb's map, as it really lies to the *North* of the Sambas. However, it is also a region. Beyond Martin Garcia on the main road just north of the *pulperia* forming the center of Martin Garcia, the party crossed a small hill capped with soft limestone and found there casts of the large *Spondylus americanus*, which proved a good index fossil in stratigraphic work. Casts of *Arca*, *Venus* and corals were also found.

Rompina was not yet found and the party was lost and obliged to stop for the night at Ranchadero (7 on the map) Here they slept in a *gallinero* (hen house). The host assigned this to the guests, first gravely untethering his game rooster and carrying it to the store. The party slept in hammocks, but were much worried about the horses, fearing *ladrones* (bandits) might steal them in the night. Ranchadero is on the Mao to Guayubin road where it passes the edge of the Rio Yaqui flood plain. The barometric reading was 170 feet altitude at Ranchedera.

Passing through Cerro Gordo (8 on map), the party met with rebels and *malo gente*, who hotly disputed whether it would not be well to begin the killing of the Americans with these,—"*Bueno para empezar con estos a matar los Americanos!*"

The next stop was Cana (9 on map) on Rio Cana on the Mao-Guayubin road. Above the ford at Cana a fine fossiliferous bed of *Serpulorbis papulosa* was found. The party camped that night in a tent near the Rompino river, a tributary of the Cana. There were a few houses there and the natives were bristling with knives. The next day an attempt was made to follow up the Cana river, but the party was misled by the cow-paths, which are exactly like the trails. But the following day a deserted shack was found back of the river. This shack Lalo (the guide) pronounced to be the true Rompino (*Rompino verdadeiro*) (10 on map). Finding nothing there, Los Quemados was made the next objective point.

Since Los Quemados is on the south side, the party had to cross the Sambas. First a trail was followed, then an old *maquina* (machine) road, formerly used in hauling gold-washing machinery across the Sambas to the old mines. This road is wide, still in fair condition, with wheels and pieces of iron scattered along. It led up and up to 870 feet altitude on its summit where it passes over the crest of the Sambas. As the road lay in a low pass, the maximum height of the Sambas was estimated at 1000 feet. This range of hills viewed from the south near Sabaneta appears as a straight, little-broken ridge, cut into by the Rio Cana. The hills are capped with rather hard limestone. They are covered with a heavy growth of timber, — a hard wood forest, the most striking tree being the *almacigo*, with very yellow scaly bark.

On beginning the descent down the Sambas, the forest opens up and discloses a magnificent view of the Las Caobas (mahogany) plain, and behind it the frowning Cordillera, always capped with ranks of cumuli. The mountains also stand in ranks, with Pico Gallo, 8000 feet high, towering in their midst. The higher peaks disappear into the clouds which seem a continuation of the mountains.

The Las Caobas plain is covered with masses of *apartillo* (bunch) grass. This grows as tall as four feet and bears spikes of reddish flowers which give the entire plain a reddish appearance. The plain is rolling with a general dip towards the Sambas, that is to the north. Among the bunch grass is the *tabaquela*, a scraggly, crooked shrub, used for making canes when well grown, as it is very tough.

Coming down the road the party branched off into an arroyo on the west, where a yellow fossiliferous clay with Pectens was found at an altitude of 540 feet. There is no village of Las Caobas, but this region is marked by the *pulperia* (country store, indicated on the sketch map as 11). Three or four miles east of this pulperia of Las Caobas the Sambas break up into more than one range towards the Rio Gurabo. Even further west they are given local names, as Cerros de Martin Garcia, de Cerro Gordo, etc. Not far from Las Caobas the party observed a small amphitheater superficially resembling a cirque, a couple of hundred feet deep, the slopes wooded except where cleared for planting bananas, and the bottom well cultivated. The whole effect was that of a great arm chair. A

Plain of Las Caobas near Sabaneta

Crystalline Outcrop, Arroyo Savana Larga at El Guanal

small arroyo runs from it into the Rio Gurabo. The amphitheater is no doubt a singular form resulting from erosion.

The Gurabo was then forded three times to observe the striking bluffs of blue clay about 100 feet high, with a characteristic concave curve. These are Gabb's "blue shales" really a hard clay not sufficiently consolidated for shales, nor are they laminated. They contain wonderfully preserved gastropods and more fragile pelecypods, among them the large *Spondylus*. Here and elsewhere in the Yaqui Valley this proved a very characteristic fossil.

Three days and a half were spent in this region on the east bank of the Gurabo collecting. The best accomodations obtainable at night were native cots in the combined chicken coop and store house at the *pulperia* of Los Quemados (12 on sketch map).

Trips up and down the river on foot were made, going as far as possible. It was impossible to ride, as there are no trails for horses.

Above Los Quemados the river cuts through limestone alternating with blue clays. The limestone tumbles in great blocks into the river and down its banks, and one has to crawl under or over these great blocks. The Gurabo river here is twenty-five to thirty-five feet wide. Its bed is of clay with gravels and bowlders from the Cordillera, the bowlders being of both metamorphic and igneous rocks. The sides are precipious, and 80 to 100 feet high. They are usually more sloping where the limestone formation is present except where it forms a protective cap. The plain of the river bottom is usually cultivated and is up to forty rods wide. One of the very characteristic trees on the banks is the *Mara*, which is magnolia-like. Abounding in the trees and bushes of the banks is a green snake, the *Culebra verde* (*Uromacer catesbyi*), which is peculiar to the island. This species is used for the Voodoo worship in Haiti.

The party left Los Quemados for Mao, by good fortune *via* Cercado (13 on the map and shown on frontispiece). This is one of Heneken's localities and it gave us a splendid yield of fossils. Six days were spent collecting at Cercado, the party stopping at the house of Senor Jose Fraden, a very intelligent and kindly man. He said there were many badly disposed people (*mucho malo gente*) in the neighborhood and therefore was so good as to send the young man of the house with the party and with the guide as a protection.

Three fossiliferous cliffs were found above Cercado and one or two below. Large collections were made from these bluffs. This occupied about a week's time. A trip was also made to the Rio Amina as far as Hato Viejo on the Amina (14 on the sketch map); and thence to Potrero (15 on map). At Potrero *Ostrea* and *Spondylus* were found, but badly preserved.

Returning to Cercado the work was interrupted by a ten foot rise of the Rio Mao. Indeed, even before this rise the current had been very swift and the fording deep. Politically also the situation was becoming daily more dangerous, especially on approaching nearer to Santiago, where Desiderio Arias, the leader of the revolution, was entrenched. It was deemed best to take the fossils secured back to Monte Cristi and so get them safely out of the interior to the port, then to obtain supplies that were needed, and try a fresh start for Santiago.

The furthest point reached up the Mao was Hato Viejo (the one mentioned by Gabb, *not* Hato Viejo on the Amina); and on the summit of the last accessible bluff, which rises some 300 feet above the river at that point, the aneroid read 650 feet, but we feel little confidence in this and give it only as approximate. There is a splendid view from the top of this cliff, looking southward, of the broken foothills of the main range. Gabb mentions four terraces here. Our party saw one very striking high level terrace about 700 feet, and a lower less pronounced terrace about 640 feet, giving an approximate difference of 50 feet. There were also other levels at a lower altitude and to the southwest, but they were ill-defined.

The party returned along the outward trail as far as Las

Caobas, where they branched off to the southwest for Sabaneta. On approaching the Cana River a limestone with enormous Turedo tubes was seen.

On crossing the Rio Cana at Caimito (16 on sketch map) in the gorge a terrace was observed about fifty feet below the general level and beneath this terrace the gorge is about fifty feet deep. The river appears from this to have been rejuvenated and the uplift to have been recent.

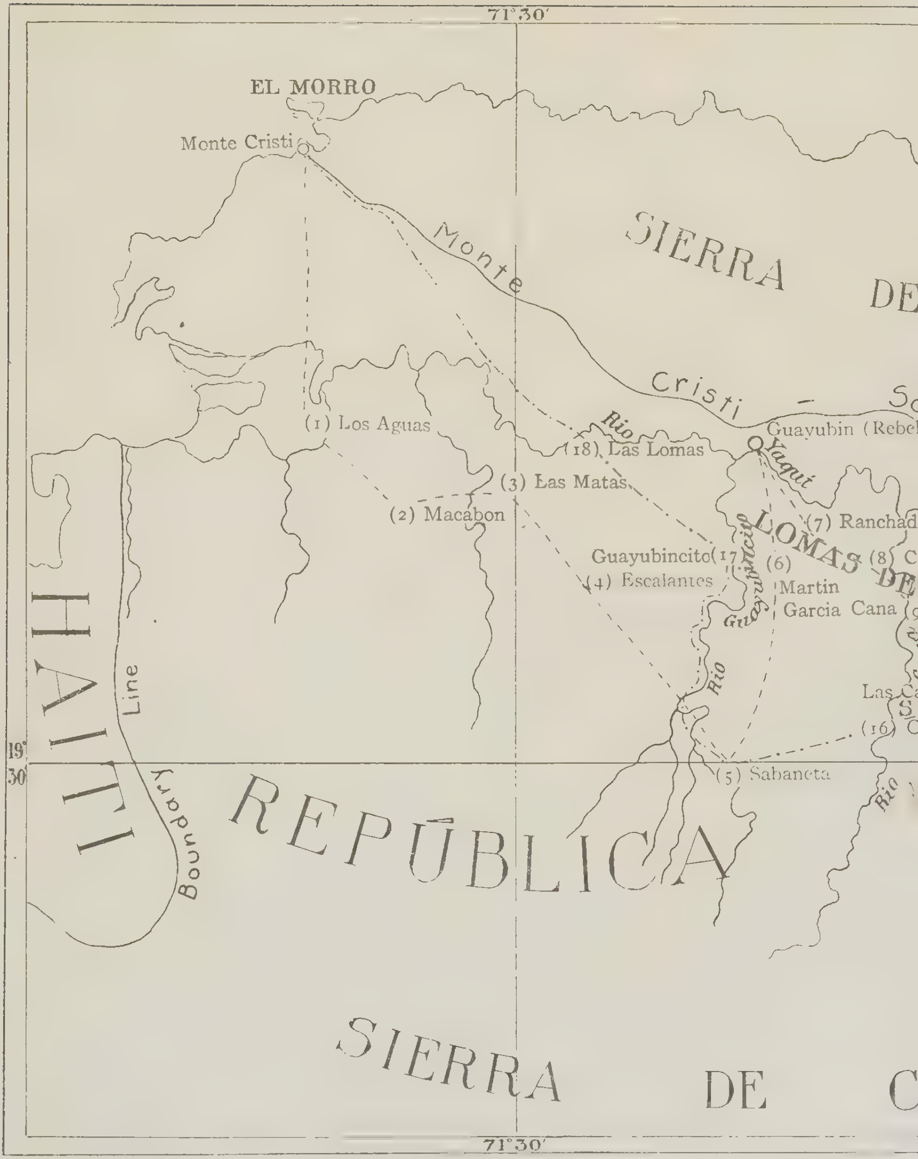
Very beautiful fossils were collected on the Rio Cana. After making collections and sections, the party rode on to Sabaneta and along the Rio Guayubincito to the town of Guayubincito (17 on the map), and then followed a road more to the west to Las Lomas (18 on the map). Between Guayubincito and Las Lomas large Ostreas were seen resembling those collected at Escalantes. Proceeding on to Castenuela, several fossiliferous outcrops were noted along the road, perhaps Pleistocene, — perhaps equivalents of Gabb's outcrops on the road to Guayubin. It was unfortunately impossible to stop to collect because of the late hour, pouring rain, and the exhausted state of the horses. So there was no choice but to press on to Monte Cristi.

The party arrived at Monte Cristi none to soon, as the Revolutionary party had begun shooting. All Americans took refuge on the United States gunboat *Panther*, and remained on board four days.

The Dominican residents who did not join the rebels fled to the beach. The town was deserted, the bush full of rebels, bandits and *malo gente*. A return to the field from the direction of Monte Cristi was obviously impossible.

Proceeding on to Puerto Plata we hoped to strike in from there to Santiago, as under normal conditions a cog-wheel railroad connects these towns. But Desiderio had captured all the locomotives. Moreover we met at Puerto Plata the American residents of Santiago as refugees who had left all their possessions and secretly fled under cover of night. Several had hidden in the bush without food for some days. Conditions in the interior were such that we were most urgently advised to abandon the attempt to reach Santiago, since Desiderio was entrenched there, and geologizing in the lonely thickets would certainly result in our being shot and never heard of again. The sight of seven dead men on the pier at Macoris convinced us that this was no idle fancy. So with profound regret we were forced to abandon the Santiago section and the study of the blue clays of the Upper Yaqui and the Nivaje, but we trust that we may yet accomplish this on a future occasion.

——:o:——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EL MORRO
Monte Cristi
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Rio Yaqui
Guayubin (Rebel
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(3) Las Matas
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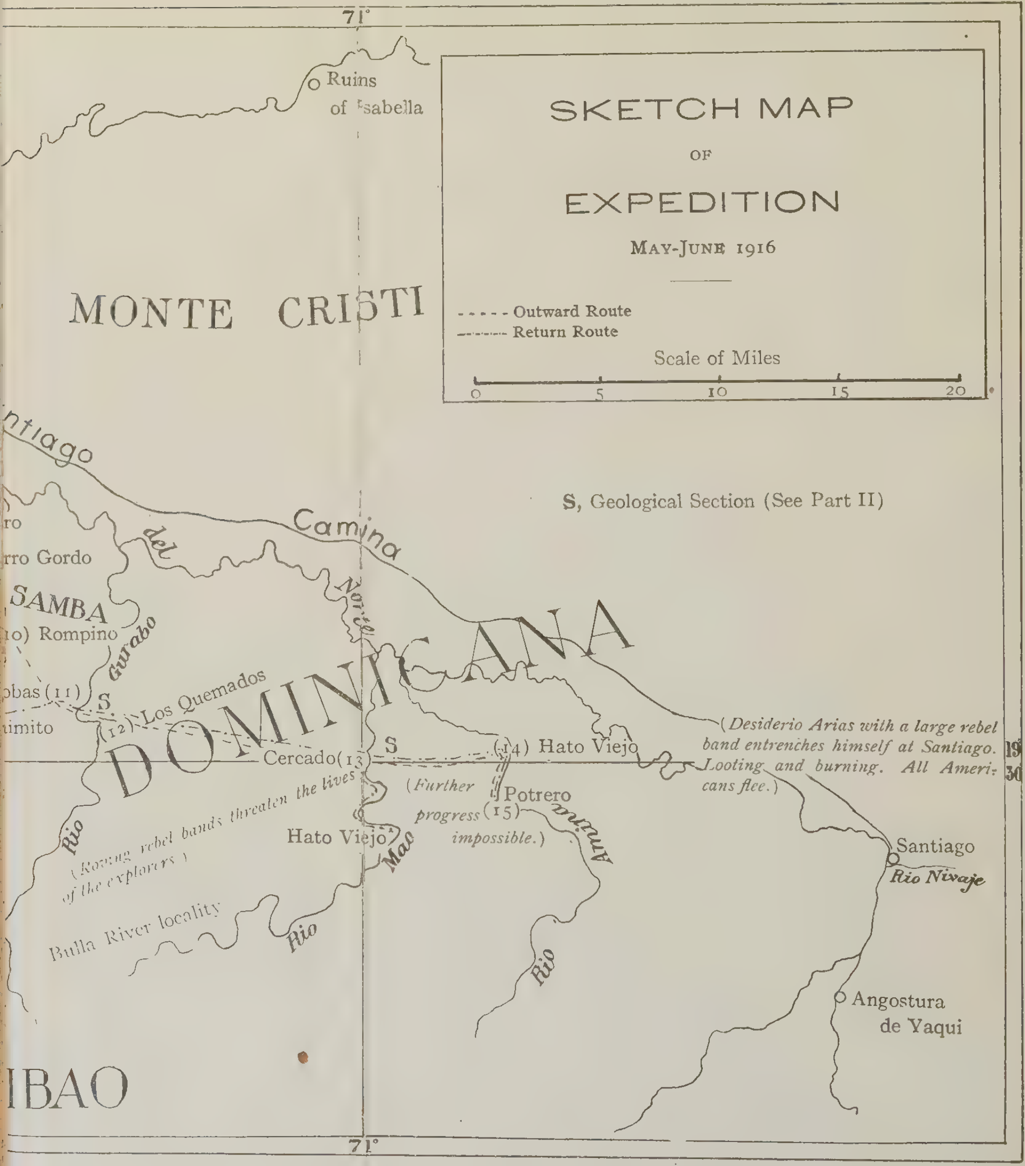

SKETCH MAP

OF

EXPEDITION

MAY-JUNE 1916

MOLLUSCA

CLASS GASTROPODA

ORDER OPISTHOBRANCHIATA

Suborder Pteropoda

Genus CAVOLINA Abildgaard

Cavolina, sp. indet.

Shell minute, resembling in some respects the recent *C. gibbosa* Rang, but not identical with that species. The ventral surface is extremely globular, evenly rounded, not crested as in *C. gibbosa*. The dorsal surface is flat, projects beyond the opening, curves upwards slightly and is strongly tri-sulcate. The single shell found is too imperfect for detailed description. Attention is merely called to the presence of the genus. A species near *C. gibbosa* is also reported by Dr. Dall from the Bowden beds, Jamaica.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao.

Suborder Tectibranchiata

Genus ACTÆON Montfort

Actæon riomaensis, n. sp.

Plate 3, Figure 1

Actæon cubensis Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 245, 1873. Not the recent shell.

Actæon punctostriatus Dall (in part), Bull. Mus. Comp. Zool. Harv. Coll., vol. 18, p. 40, 1889: Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 14, 1890. Not *A. punctostriatus* C. B. Adams 1840.

Shell ovate, with four and a half gently convex whorls, suture well defined; outer lip thin, produced anteriorly; inner lip with a slight callus; columella straight, bearing a single very strong plication; last whorl ornamented with a series of fine spirals, appearing under a lens as delicately puncticulate or finely serrate lines which extend usually over half, but sometimes over all the volution and are occasionally obsolete; examined under the compound microscope the sculpture is seen to consist of narrow grooves, with cross bars, alternating with wider smooth bands, the barred grooves producing the punctate effect when less highly magnified. Length of large specimens 4.5, greatest width 2.25 mm.

Our species is evidently* that which Gabb also collected and identified with d'Orbigny's recent Cuban shell *A. punctata* (La Sagra, Hist. Pol. y Nat. Isla de Cuba, Atlas 8, pl. 17, figs. 10-12). Since that name had been preoccupied by Lea, Gabb renamed Orbigny's shell *A. cubensis* (Trans. Amer. Phil. Soc., vol. 15, p. 245, 1873). But the Dominican species is not identical with the recent Cuban shell, which is only about half the size of the Dominican fosssil, — measuring about 2.25 to 2.50 mm. and having five whorls, while the fossil shells of that size are immature, with only three volutions. Moreover the plication of the fossil is much stronger and the magnified sculpture of d'Orbigny's shell as figured is quite unlike that of our shell.

Gabb's name *A. cubensis* should stand only for the recent form called by d'Orbigny *A. punctatus*.

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*Gabb's specimens of this *Actæon* and all of his Dominican types have been for two-score years in the possession of the Philadelphia Academy. For years they have been undergoing a gradual revision. Until such time as this is completed they are not available for comparative study. Fortunately we have generally had access to Gabb's metatypes.

Our specimens when compared with figures of Adams' *A. punctostriatus* (first found in New Bedford harbor) appear quite different. The Dominican shells are slenderer and much larger, an individual measuring .10×.075 inches (which are the measurements given for *A. punctostriatus*) is immature and with three instead of four or five whorls. The form of the spire is also unlike and the body whorl of the Dominican shell is much less inflated.

Locality — (Exp'd '16) Bluff 3, Cercado de Mao (abundant).

Genus ACTEOCINA Gray

Acteocina canaliculata Say

Plate 3, Figure 2

Volvaria canaliculata Say, Jour. Acad. Nat. Sci. Phila., vol. 5, p. 211.
Bullina canaliculata Say, Amer. Conch.. pl. 39, 1830.
Tornatina canaliculata Guppy, Geol. Mag., p. 437, 1874.
Tornatina canaliculata Dall, Bull.37 U. S. Nat. Mus., p. 84, pl. 52, fig. 27, 1889; Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 15; 1890; *Id.* pt. 6, p. 1583, 1903.
Not *Tornatina canaliculata* d'Orbigny, De la Sagra, Hist. Pol. y Nat. Isla de Cuba, p. 133, pl. 4 *bis*, figs. 21-24 (=*T. ballata* Kiener).

Shell minute, cylindrical, marked by faint, arcuate, longitudinal growth-lines; spire channeled, somewhat elevated, apex projecting as a fine point; whorls about five; outer lip arcuate, inner lip with a thin calcareous plate, and a single plication near the base. Length 3, greatest width 1.5 mm.

This widely distributed and variable species is now living from Cape Cod to the Florida Keys and in the Gulf of Mexico. Dall reports it from the Pliocene of Florida, Post-Pliocene of South Carolina and Florida, and a varietal form from Bowden, Jamaica. Guppy listed the species in 1874 from the Pliocene of Trinidad. It has not heretofore been found in the blue clays of Santo Domingo, but our shell agrees well with Say's figure of the type which was collected on the coast of South Carolina.

Localities. — (Exp'd '16) Bluff 3, Cercado de Mao (rare); Zone H, Rio Cana near Caimito.

Acteocina recta d'Orbigny

Plate 3, Figure 3

Bulla recta d'Orbigny, De la Sagra, Hist. Pol. y Nat. Isla de Cuba, vol. 5, p. 67, no. 55, 1845; Atlas 8, pl. 4 *bis*, figs. 17-20, 1855.
Tornatina recta Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 246, 1873.
Tornatina coix-lacryma Guppy (in part), Quart. Jour. Geol. Soc. London, vol. 22, p. 518, 1876. Not *T. coix-lacryma* Guppy, Geol. Mag., vol. 4, p. 500, fig. 3, 1867.
Tornatina recta Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 15, 1890, *Id.* pt. 6, p. 1583, 1903.
Cf. *Tornatina coix:lacryma* Cossmann (in part), Journ. de Conchyliologie, vol. 61, p. 4, pl. 1, figs. 12, 13, 1913.

Shell minute, oblong, cylindrical, chiefly smooth, a few specimens very finely, obsoletely, microscopically, spirally sub-striate; spire very short, the first whorl projecting as a knob; suture canaliculate, aperture linear, widening suddenly; columella smooth. Length of shell 2.5, greatest width 1.25 mm.

This species differs markedly from *A. coix-lacryma* Guppy in the form of the spire. In *A. coix-lacryma* the spire is sunken and only the knob-like point is visible above the plane of the last whorl; while in *A. recta* the spire though short is not sunken and the coils of the volutions can be seen below the apical knob.

We have a number of Gabb's specimens (C. U. Museum No. 7637) for comparison.

M. Cossmann has referred a specimen from Martinique to *A. coix-lacryma*, in the synonymy of which he places *A. recta*. The Martinique shell is nearly three times as large as Gabb's, d'Orbigny's, or ours.

Gabb and Guppy identified *A. recta* from Santo Domingo, and Dall from the Bowden beds, Jamaica.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao.

Acteocina (*Cylichnella*) *triticum-tritonis*, n. sp.

Plate 3, Figure 4

Cylichnella bidentata Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 273, 1873.

Cylichna bidentata Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 518, 1876.

Cylichnella bidentata Dall (in part), Bull. Mus. Comp. Zool. Harvard Coll., vol. 18, p. 46, 1889.

Tornatina (*Cylichnella*) *ovum-lacerti* Dall (in part), Proc. U. S. Nat. Mus., vol. 18, no. 1035, 1895.

Not *Bulla bidentata* d'Orbigny, De la Sagra, Hist. Pol. y Nat. Isla de Cuba, p. 125, Atlas, pl. 4, figs. 13-16, 1845. Not *Cylichna bidentata* Adams, 1850.

Not *Cylichnella bidentata* Gabb, Proc. Acad. Nat. Sci. Phila., vol. 24, p. 273, pl. 10, fig. 2, 1872. (Recent Cuban shell, figured after d'Orbigny's.)

We collected several hundred shells of a *Cylichnella*, in the blue clays of Santo Domingo, of which the larger measure 3 mm. in length and 1.25 to 1.50 mm. in greatest width. The majority of the shells are slightly smaller than 3 mm. All are grooved with incised spiral lines only at the base.

Thus in size and sculpture our fossils resemble d'Orbigny's recent shell, *C. bidentata* living from Hatteras to Santo Domingo. But the anterior plication in the recent shell is represented in both d'Orbigny's and Gabb's figures as very prominent. In our fossil shells it is so inconspicuous as to be scarcely observable. The posterior fold on the contrary in the fossils is very strongly developed. This appears to be just the reverse of the conditions in *C. bidentata.*

In the columellar characters our fossils are more like Guppy's *C. ovum-lacerti*, which has a single strong tortuous columellar fold. But our species is much smaller than Guppy's Trinidad shell and is striate only at the base instead of over the entire surface. Guppy himself pronounced Heneken's Santo Domingo specimens an *allied but smaller species.*

Gabb also collected specimens of our species in Santo Domingo, as we have some he sent to Cornell (C. U. Museum No. 7638), but among them is one single larger shell measuring 4 × 2 mm. This may be that which Dr. Dall unites with Guppy's *ovum-lacerti.* None of ours attain that size.

Localities. — (Exp'd '16) Bluff 3 (very abundant), Bluff 2 (one only), Cercado de Mao; Zone H (one only), Rio Cana at Caimito.

Acteocina (*Cylichnella*) *ovum-lacerti* Guppy

Cylichna ovum-lacerti Guppy, Geol. Mag. London, vol. 11, p. 407, pl, 18, fig. 22, 1874.

Cylichnella bidentata Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 273, 1873.

Tornatina (*Cylichnella*) *ovum-lacerti* Dall (in part), Proc. U. S, Nat. Mus., vol. 18, no. 1035, p. 27, 1895.

As noted under the preceding species, among hundreds of Cylichnellas we have none over 3 mm. in length; but one of Gabb's Dominican shells sent to Cornell (Museum No. 7638) as *C. bidentata* is 4 mm. in length by 2 in width. The shell is worn so one cannot tell whether the entire surface was striate, but its size alone discriminates this shell from all the rest. Apparently it is referable to Guppy's species.

As with all of Gabb's Dominican specimens, no locality is given; but Dr. Dall has identified as *C. ovum-lacerti* specimens No. 113746 in the U. S. National Museum from Potrero, Rio Amina. The type locality was Trinidad.

Genus VOLVULA A. Adams

Volvula cylindrica Gabb

Plate 3, Figure 5

Volvula cylindrica Gabb, Trans, Amer. Phil. Soc., vol. 15, p. 246, 1873.

Volvula cylindrica Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 518, 1876.

Volvula oxytata Bush, Trans. Conn. Acad., vol. 6, p. 468, pl. 45, fig. 12, 1885.

Volvula oxytata Dall, Bull. 37, U. S. Nat. Mus., p. 86, pl. 41, fig. 12, 1889.

Volvula cylindrica Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 16, 1890; *Id.* pt. 6, p. 1583, 1903.

Cf. *Bulla* (*Volvula*) cf. *oxytata* Toula, Jahrb. K—K. Geol. Reichsanst., Wien, vol. 58, p. 709, pl. 28, fig. 4, 1908.

Shell minute, sub-cylindrical, anterior end rounded, marked by a few faint, fine striae, posterior end sharply and conspicuously pointed; aperture linear, widening anteriorly, inner lip slightly thickened at the base and reflexed. Length of shell 4 mm., greatest width 1.5 mm.

Dr. Dall notes that this species is identical with Miss Bush's recent species *Volvula oxytata*, now living from Hatteras to Cape Fear and reported doubtfully from the West Indies. To a less degree it resembles the Cuban recent shell, *Volvula acuta* d'Orbigny, which is broader and less cylindrical in form.

V. cylindrica was found by Dall in the Bowden beds, Jamaica. The type locality is Santo Domingo. Guppy also identified it in Heneken's collection from the Yaqui Valley.

Localities. — (Exp'd '16) Bluff 2, Cercado de Mao (very rare); Bluff 3, Cercado (very abundant); Zone I, Rio Cana (scarce).

Genus RETUSA Brown

Retusa yaquensis, n. sp.

Plate 3, Figure 6

Shell small, sub-cylindrical, broadening slightly anteriorly, not constricted near the middle; minutely perforate; spire sunken, umbilicate; outer lip elevated posteriorly above the spire, its margin forming a U-shaped upward curve, then it becomes a trifle inflected along the center, and slightly produced anteriorly; inner lip thickened anteriorly and reflected over the umbilical region; pillar with a single plication; anterior end of the shell sculptured by about half a dozen faint, wavy, unequal spiral lines; posterior end similarly sculptured with about twice as many spirals extending a varying distance up towards the center of the whorl. Length of shell 3.50, greatest width 1.50.

This appears to be the first *Retusa* found in the blue clays of Santo Domingo. It is rather scarce.

Localities. — (Exp'd '16) Bluff 3, Cercado de Mao (one specimen); Zone H, Rio Cana (six specimens).

Genus ATYS Montfort

Atys doliolum, n. sp.

Plate 3, Figure 7

Shell minutely cask-shaped, centrally inflated, narrowing towards either end; aperture as long as the shell, extending behind the inner lip and descending with a twist upon the apical region of the concealed spire; outer lip rising abruptly above the periphery, its outer margin forming an angle of about 65°, then continuing in a gentle curve to the base, where it is slightly expanded and sub-truncated; inner lip with a callus, thickest anteriorly; pillar straight, smooth; posterior periphery of body whorl bordered with a callus band continuous with the callosity of the inner lip and with the angulated margin of the outer lip; body whorl smooth medially, sculptured anteriorly and posterly with fine, incised spiral lines. Length of shell 2.75, greatest width 1.25 mm.

This pretty and rare little shell is strikingly like the Chipolan Oligocene species *Atys œdemata* Dall (Proc. U. S. Nat. Mus. No. 1035, vol. 18, p. 28, 1895; Trans. Wag. Inst., vol. 3, pt. 6, pl. 59, fig. 24, 1903). But the specimens described of that species were nearly twice as large as our Dominican shells, and even so were immature. The heavy callus bands would indicate that our little shells have attained their full growth, though so minute. Apparently this is the first *Atys* ever found in the Santo Domingo blue clays.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao (rare).

Genus BULLARIA Rafinesque

(*Bulla* Linné)

Bullaria paupercula Sowerby

Plate 3, Figure 8

Bulla paupercula Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 52, 1849.

Bulla paupercula Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 246, 1873.

Bulla paupercula Guppy, Geol. Mag. London, p. 437, 1874; Quart. Jour. Geol. Soc., vol. 32, p. 518, 1876.

Bulla paupercula Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 18, 1890.

Bulla striata Dall, Trans. Wagner Inst., vol. 3, pt. 6, p. 1583, 1903.

Shell ovate-oblong, smooth except for a few spiral impressed lines near the base; inner lip with a band of callus extending the entire length, but thickest anteriorly. Length of a good-sized shell 21, greatest width 12 mm.

As Guppy and Gabb have noted, this species is very close to the recent *Bulla amygdala* Dillwyn, and Dr. Dall thinks it identical with *Bulla striata* Bruguiere, the Mediterranean analogue of *B. amygdala.* Our party collected quantities of *B. amygdala* from the Monte Cristi beach and the shells resemble greatly our fossils from the blue clays, but the recent tend to be nearly twice as large. As long as Sowerby's species has been so much used it seems best to retain it for the fossil; but evidently the species has simply lived on apparently uninterruptedly and become the recent somewhat larger shell known as *B. amygdala.*

Bulla paupercula is very common in Santo Domingo, where it was collected by Heneken and Gabb, and Dall lists it as *Bulla striata* from the Bowden beds, Jamaica.

Localities. — Bluff 3, Cercado de Mao; Zone G, Rio Gurabo; Zones H and I, Rio Cana; sandy clays and gravels, Rio Cana. (Very abundant on the upper Cana.)

Bullaria Sarahberlineræ n. sp.

Plate 3, Figure 9

Shell large, ovate-cylindrical, spire deeply involute, sunken, outer lip slightly raised above the spire, rounded anteriorly; inner lip reflexed and thickened anteriorly and with a thinner, posterior callus; the surface of the shell in well-preserved specimens is very beautifully marked with a series of very delicate lighter and darker alternating bands, parallel to one another and to the margin of the outer lip. These bands narrow and converge towards the spire and increase to a width of about 2 mm. at the middle of the shell. Due to an interesting optical quality, these bands when viewed in reversed lights are interchanged, the light and dark zones changing place, like certain signs arranged on a series of slats which read differently from diverse points of view. Length of shell 45, greatest width 32 mm.

We found, as it were a nest, of about fifteen of these beautiful great Bullarias in a single spot up the Cana and nowhere else. In size and general form this species resembles specimens in the Newcomb collection of the large *B. ampulla* Linné from the East Indies.

This magnificent species of the genus *Bullaria* is affectionately and gratefully dedicated as a tribute to the memory of Mrs. Sarah Berliner.

Locality. — (Exp'd '16) Zone I, Rio Cana; near Caimito.

Bullaria granosa Sowerby

Plate 3, Figure 10

Bulla granosa Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 51, pl. 10, fig. 10, 1849.
Bulla granosa Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 246, 1873.
Bulla granosa Guppy, Geol. Mag. London, p. 437, 1874; Quart. Jour., vol. 32, p. 518, 1876.

Shell ovate-globular, thin, spire inrolled, body whorl ventricose, handsomely sculptured with fine impressed spiral lines crossed by longitudinal arcuate growth-lines; inner lip with a rather wide band of callus, thickest anteriorly, where it is defined by a narrow groove. Length of shell 22, greatest width 17 mm.

This fine shell does not appear to have been found except in Santo Domingo.

Sowerby quotes its resemblance to *Bulla hydatis* in form, but that species is very much more globose.

Locality. — (Exp'd '16) Zone I, Rio Cana.

Genus RINGICULA Deshayes

Ringicula dominicana, n. sp.

Plate 3, figure 11

Ringicula semistriata ? Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 225, 1873. Not *R. semistriata* d'Orbigny.

Cf. *Ringicula tridentata* Guppy, Quart. Jour. Geol. Soc. London. vol. 32, p. 518, 1876. Not *R. tridentata* Guppy, 18 4.

Shell exceedingly minute, broadly conic, with four to four and a half whorls, the apical obtuse and flattened; body whorl sculptured anteriorly by well-defined, microscopic, incised spiral lines, extending a varying distance over the whorl, but not further than the posterior limit of the aperture; inner lip with a callus and a single strong, lamellar plication on the body, columella with two strong, parallel, proximate, oblique, lamellar plications; outer lip thickened and having a single median tooth. The largest specimens are 1.5 mm. in length, greatest width .75 to 80 mm., but the large majority of the shells are only about 1 mm. long.

This species bears considerable resemblance to Guppy's unfigured *R. tridentata* from Bowden, Jamaica, but both Guppy and Dall describe that species as entirely smooth. Guppy referred Heneken's Dominican specimens to *R. tridentata*, but possibly they were smooth and did not show the characteristic basal striæ.

Gabb evidently had the same species as ours and referred it with a question to *R. semistriata*, a recent Jamaican shell described by d'Orbigny. Gabb remarked that his specimens seemed more elevated. Our shells appear not so inflated, the outer lip not so heavily thickened, the aperture wider, and the apex more blunt than d'Orbigny's figures indicate. Moreover most of ours are only half the size of the latter species. Apparently the Dominican species is distinct, but very closely allied to *R. semistriata*.

The Gatun analogous species, *R. hypograpta* Brown and

Pilsbry, is also sculptured over the anterior half of the body whorl, but the spirals are closer and the spire appears shorter and the body broader than in our shell.

Locality. — Bluff 3, Cercado de Mao. (Abundant).

ORDER CTENOBRANCHIATA

(*A.*) *SUPER-FAMILY TOXOGLOSSA*

Genus TEREBRA Adanson

Terebra sulcifera Sowerby

Plate 3, Figure 12

Terebra sulcifera Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 47, 1849.

Terebra robusta Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 224, 1873. Not *T, robusta* Hinds, Proc. Zool. Soc., p. 149, 1843.

Terebra sulcifera Guppy (in part), Quart. Jour. Geol. Soc., vol. 32, p. 525, pl. 29, fig. 8. 1876.

Heneken collected three Terebras in Santo Domingo, which Sowerby named *sulcifera*, *inæqualis* and *bipartita*, from their striking characteristic sculpture.

When Guppy, in 1876, examined the types he found he could establish no constant differences between them aud placed the last two species in the synonymy of the first. The extreme forms are, however, very different in aspect.

T. sulcifera has the early whorls deeply sculptured, but with age the sculpture is lost and the whorls increase rapidly in diameter. Both these characteristics are more remarkably developed in the related species, *T. Gabbi* Dall.

The ornamentation of the earlier whorls of *T. sulcifera* consists of two thickened, sub-sutural bands, the second (anterior) being about half the width of the first, and both bands being crossed obliquely by very fine riblets. The two bands occupy about two-thirds of the whorl. The remaining third appears sunken and is crossed by very fine vertical riblets. After ten or more volutions this sculpture becomes progressively weaker, the two thickened bands first losing their riblets. The three sets of riblets are at first discontinuous, but later become continuous. A fragment including nine whorls measures 65 by 15 mm.

Specimens of *T. sulcifera* from Bailey's Ferry, Florida, have the early whorls exactly like those of the Dominican shells, but the second band in the later whorls tends to be slightly narrower.

The species is also reported by Guppy and Dall from the Bowden beds, Jamaica. Our specimens were collected by Gabb in Santo Domingo.

Terebra Gabbi Dall

Terebra Gabbi Dall, Proc. U. S. Nat. Mus., vol. 18, no. 1035, p. 34, 1895.

Terebra Gabbi Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, pl. 59, fig. 31, 1903.

This singular species, which appears like an abnormality, is characterized by very rapid increase in diameter, and complete loss of sculpture on attaining old age. Dr. Dall's type in a length of 70 mm. widened from 2.75 to 24 mm. It is a culmination of the tendency begun in *T. sulcifera.*

Type locality. — Potrero, Rio Amina (Bland).

Terebra bipartita Sowerby

Plate 3, Figure 14

Terebra bipartita Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 47, 1849. Not *T. bipartita* Deshayes, 1859.

Terebra bipartita Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 225, 1873.

Terebra (*Acus*) *bipartita* Dall, Proc. U. S. Nat. Museum, vol. 18, no. 1035, p. 38, 1895.

Whorls girdled by a single incised line cutting them into nearly equal halves; ornamentation of undulating longitudinal riblets rendered discontinuous by the girdling line. Length of a fragmentary shell 50, greatest diameter 12 mm.

According to Sowerby the columella of *T. bipartita* is smooth, and Dall also says the pillar of this form seems to be simple and smooth. But our specimen which was sent by Professor Gabb to Cornell (Museum No. 7665) is broken away considerably at the aperture and this reveals very definitely two sharp plications on the columella; — but far within, at least a quarter of a revolution, so that they could not been seen were the shell unbroken. The fact that the columella is biplicate in *T. bipartita* adds strong evidence to the relationship established by Dr. Dall of the three forms *T. spirifera*, *T. oligomitra* and *T. cirrus* with *T. bipartita*. It seems much more probable that these three, which all have biplicate columellas, are of the *bipartita* group if *bipartita* itself has two columellar plications.

Apparently either Sowerby's specimens were perfect and the folds were completely hidden, or else what seems very probable, his descriptions of the characters of the columella of *T. bipartita* and his preceding species, *T. inæqualis*, became transposed by some mistake, — for he says* of *inæqualis*, "columella antice biplicata" and of *bipartita*, "columella antice laevi". As a matter of fact, as shown by the figure, our *bipartita* columella is *biplicate* like all those of the *bipartita* group. Our *inæqualis* series shows that the columella may appear smooth when the shell is complete, but it invariably has within *one* sharp plication.

The type locality for *T. bipartita* is Santo Domingo; but it has also been found in the Chipola marls, Calhoun County, Florida.

Terebra spirifera Dall

Plate 3, Figures 15, 16

Terebra dislocata Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 225, 1873. Not *dislocata* Say.

Terebra (*Acus*) *bipartita* (Sowerby) variety *spirifera* Dall, Proc. U. S. Nat. Museum vol. 18, no. 1035, p. 38, 1895.

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*Quart. Jour. Geol. Soc., vol. 6, p, 47, 1849, *Terebra* (*Oxymeris*) *bipartita* (Sowerby) variety *spirifera* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, pl. 59, fig. 13, 1903.

Shell of medium size, whorls twelve to fourteen, tapering rapidly to an acute spire; spiral ornamentation slightly more pronounced than the transverse. The former consists of typically four (sometimes reduced to three) narrow, flattened bands encircling each whorl of the spire below the sutural zone. The transverse sculpture consists of many close-set riblets which cross the sutural zones sharply and almost perpendicularly, then swing back a trifle in the narrow subzonal channel, but resume a perpendicular direction on passing under the four spirals which are wound over the riblets. The columella bears two sharp folds. Specimens range from 25 to 35 mm. The type measured 30×8 mm.

In grouping the Dominican Terebras the presence or absence of columellar plications is of much assistance. Thus all the specimens of *spirifera*, *oligomitra*, and *cirrus* show the two folds on the columella, a character which throws them into the *T. bipartita* group, and differentiates them readily from Toula's Isthmian types.

Localities. — (Exp'd '16) Bluffs 2 and 3, Cercado de Mao; Zone I, Rio Cana near Caimito.

Terebra cirrus Dall

Plate 3, Figure 17

Terebra (*Acus*) *bipartita* Sowerby variety *cirrus* Dall, Proc. U. S. Nat. Museum, vol. 18, no. 1035, p. 38, 1895.

Tecebra (*Oxymeris*) *bipartita* Sowerby variety *cirrus* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, pl. 59, fig. 28, 1903.

This shell bears a general resemblance to *T. spirifera* Dall, but can be distinguished from the latter species from the fact that in this shell the spirals are more numerous (five or more to a whorl instead of four), less raised, more irregular, and have a more crowded aspect. The transverse riblets are low, narrow, with wider interspaces. Columella with two sharp folds. Length of type 25, greatest diameter 5.5 mm. Our specimens run from 21 to 32 mm. in length and 5 to 7 in greatest diameter.

The biplicate columella at once places the species in the *T. bipartita* group and separates it from the Isthmian *T. gatunensis*, which it resembles somewhat in ornamentation.

The type of *T. cirrus* is from the Rio Amina.

Localities. — (Exp'd '16) Zone G, Rio Gurabo, at Los Quemados; Zone I, Rio Cana, at Caimito; and Bluff 3, Cercado de Mao.

Terebra oligomitra Dall

Plate 3, Figure 18

Terebra (*Acus*) *bipartita* Sowerby variety *oligomitra* Dall, Proc. U. S. Nat. Museum, vol. 18, No. 1035, p. 38, 1895.

Terebra (*Oxymeris*) *bipartita* Sowerby variety *oligomitra* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, pl. 59, fig. 29, 1903.

This species resembles *T. spirifera* Dall, but the ornamentation is bolder and more striking. As in that species there are four spiral bands between the sutural zones, but the spirals in this shell are of less nearly equal in width and less strongly defined. In *spirifera* the spirals are somewhat stronger than the transverse riblets, but in *oligomitra* the opposite is true, the riblets being very sharp, thin, and well-defined. The three posterior spirals of the four lying between the sutures are narrower than the anterior one and tend to group themselves together. Subzonal channels striking. Columella rather long, twisted, bearing two sharp folds. Length of decollate shell (of nine whorls) 36 mm., diameter 8. The type, also decollate, measured 38 by 8.5 mm.

This species attained a somewhat larger size than its nearest ally, *T. spirifera*. Its biplicate columella places it at once in the *T. bipartita* group.

The type locality is the Rio Amina.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao.

Terebra gausapata variety *lævifasciola*, n. var.

Plate 3, Figure 19

Shell small, very slender and elongate, resembling *T. gausapata* Brown and Pilsbry from Gatun (Proc. Acad. Nat. Sci. Phila., pp. 340-341, pl. 22, figs. 8, 9, 1911) and is probably a vaciety of that species. The specimens of *T. gausapata* were fragmentary, but they show the strikingly deep sulcus beneath the subsutural fasciole which is very marked in the Dominican shell. In *gausapata*, however, this fasciole is ornamented with three spirals, while in our shell it is smooth. This has suggested the varietal name. Our shell has sixteen whorls, separated by a wavy suture; each whorl is sculptured by about fifteen longitudinal riblets which are very strongly developed on the subsutural band, but on crossing the deep sulcus are low and diminished to half their thickness, they then continue over the remainder of the whorl in a slightly oblique direction. The anterior portion of each whorl is ornamented by about seven spiral threads which do not cross the riblets; columella with two sharp folds. Length of shell 18, greatest diameter 3.5 mm. Rare.

The biplicate columella and the deep sulcus beneath the subsutural band show the close relationship of this shell to the *T. bipartita* group.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao.

Terebra Cambiarsoi, n. sp.

Plate 3, Figure 20

Shell small, acute, whorls about eleven, all except the nuclear being ornamented with narrow, longitudinal riblets; subsutural band distinct, marked off by a narrow, deep sulcus, the portion of the whorl anterior to this sulcus sculptured with two sharply incised spiral lines which do not cross over the longitudinal riblets. Columella with two distinct plications. Length of shell 14, greatest width 4 mm. Rare.

In its size and in the scarcity of spiral lines sculpturing the whorls this shell recalls *T. amitra* Dall from Potrero, Rio Amina; but it can be instantly differentiated from that shell by the absence in *amitra* of any definite sub-sutural band and sulcus.

Indeed *T. Cambiarsoi* is quite distinct from any of the many Terebras in the Cornell Museum; but its sharply biplicate columella and deep sulcus beneath the sub-sutural fasciole place it in the *T. bipartita* group of which so many of the Santo Domingo Terebras are representatives.

This species is named in honor of Senor Rodolfo D. Cambiarso, of Santo Domingo City, a most ardent student of the natural history and archæology of his native island.

Locality. — (Exp'd '16). A single specimen was found in Bluff 3, Cercado de Mao.

Terebra amitra Dall

Plate 3, Figure 21

Terebra (*Oxymeris*) *amitra* Dall, Proc. U. S. Nat. Mus., vol. 18, no. 1035, p. 39, 1895; Trans. Wagner Inst. Sci., vol. 3, pt. 6, pl. 59, fig. 19, 1903.

We unfortunately did not collect any specimens of this rare little Terebra, of which there is a single shell in the National Museum. It measures 9.5 mm. in length and was collected at Potrero, Rio Amina.

Terebra protexta Conrad

Plate 4, Figure 1

Cerithium protextum Conrad, Proc. Acad. Nat. Sci. Phila., vol. 3, p. 26, 1845.

Terebra dislocata Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 225, 1873. Not *dislocata* Say. Exclude synonymy.

Acus protextus Dall, Rep. Blake Gastr., Bull. Mus. Comp. Zoology Harvard Coll., vol. 18. pp. 63, 65, 1889.

Terebra (*Acus*) *protexta* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 25, 1890.

Shell small, slender, elongate, whorls sculptured with about eighteen very fine longitudinal riblets, well developed on the subsutural fasciole and continuing over the remainder of the whorl beneath the slight sulcus marking off the fasciole; spiral sculpture of four narrow, flat bands on each whorl between the fasciole and the suture of the following volution, and a spiral thread usually lies next to the suture, anterior to the bands. Length of fragmentary shell with eleven whorls, 12 mm., greatest diameter 4 mm.

Among some specimens labelled *T. dislocata* Say by Gabb, collected by him in Santo Domingo (C. U. Museum No. 7666) is a single shell exactly like a specimen of *T. protexta* Conrad in the Newcomb collection, dredged in Sarasota Bay. The latter is a typical example of Conrad's species and its sculpture matches perfectly that of the fossil shell. The fossil is much more like the recent specimens of *protexta* than like the Miocene representatives of that species.

T. protexta is now living from Hatteras to Texas in 2-50 fathoms. It has apparently not been found in the recent Antillean molluscan fauna, but is present in the Miocene of the Carolinas, Pliocene of South Carolina and Florida, and Post-Pliocene of North Carolina and Florida. Unfortunately, like all Gabb's specimens, our Dominican shell has no locality label further than Santo Domingo.

Terebra inæqualis Sowerby

Plate 4, Figure 2

Terebra inæqalis Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 47, 1849.
Terebra inæqualis Guppy, Quart. Jour. Geol. Soc., vol. 22, p. 290, 1866.
Terebra inæqualis Gabb, Trans. Amer. Phil. Soc., vol. 14, p. 224, 1873.

Shell slender, tapering to an acute spire, earlier whorls with a sub-sutural raised band followed by a second band about half the width of the first, from which it is separated by an impressed line. The two bands occupy slightly more than half the whorl. In the later whorls of large specimens the second band becomes more or less obsolete and the sulcus then appears to divide the whorl into unequal parts, which was the origin of the specific name. The entire shell is sculptured by very fine transverse riblets which are oblique posteriorly and become arcuate anteriorly on traversing each whorl. Young shells show fine spiral striæ which are later obsolete.

As noted under *T. bipartita*, Sowerby by some error describes the columella of *inæqualis* as biplicate and that of *bipartita* as smooth. These remarks were apparently transposed since *bipartita* is *biplicate*, and *inæqualis* appears smooth when the shell is perfect, but when the outer lip is broken away one distinct terminal plication is revealed. Columella short, with a slender, external keel. Length of medium sized shell of which the early whorls are lost 60 mm., greatest diameter 12, number of whorls included 17.

This species is closely related to *T. sulcifera*, which it resembles in the style of sculpture, but it differs in retaining its slender form throughout life and its sculpture does not become obsolete.

Guppy reported *T. inæqualis* from Cumana (Venezuela), and small specimens from Jamaica. Dall also cites it from the Bowden beds, Jamaica.

Localities. — (Exp'd '16) Zones E and D, Rio Gurabo at Los Quemados.

Terebra haitensis Dall

Plate 4, Figure 3

Terebra haitensis Dall, Proc. U. S. Nat. Mus., vol. 18, no. 1035, p. 35, 1895.

Terebra (*Hastula*) *haitensis* Dall, Trans, Wagner Inst. Sci., vol. 3, pt. 6, pl. 59, fig. 31, 1903.

This species very closely resembles *T. inæqualis*, from which it may be differentiated by its bolder and less regular sculpture. Our figure shows the single, strong plication on the columella which places it in the *T. inæqualis* group. An incomplete specimen measures 50 × 10, and includes eleven whorls. Dr. Dall's type measures 62 × 11.5 mm. The type locality is Potrero, Rio Amina.

Locality. — (Exp'd '16) Bluff 1, Cercado de Mao.

Terebra Petiti, n. sp.

Plate 4, Figure 4

Shell rivaling in size the recent Oriental *T. flammea* Linné. Our single specimen is decollate but seventeen whorls remain. The earlier of these show much the same sculpture as *T. inæqualis* of which I at first thought this might be a large variety. Length of incomplete shell 113, greatest diameter 19 mm.

Clearly this splendid Terebra is of the *T. inæqualis* stock. Its living ally and probable descendant is a rare shell, *T. texana* Dall, found on Matagorda Island, Texas, (Proc. U. S. Nat. Mus. No. 1264, p. 502, pl. 29, fig. 8, 1902). But the two sub-sutural bands in the recent shell occupy two-thirds of the whorl instead of about half as in the fossil, and the longitudinal riblets are less continuous and less arcuate than in the fossil. Dr. Dall says *T. texana* is the only true Terebra *sensu stricto* living on our coasts. Apparently the western migrants have lived on in the Gulf of Mexico but the ancestral members have become extinct in the Antilles.

I take great pleasure in dedicating this fine Terebra to Mr. Isaac Petit, American Consul at Monte Cristi, as a mark of appreciation of his kindness to our party, his efficient aid, and his sincere interest in the welfare and success of our Expedition.

Locality. — (Exp'd '16) Zone A, Rio Gurabo, at Los Quemados.

Terebra gatunensis Toula

Plate 4, Figure 5

Terebra dislocata Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 225, 1873. Not T. *dislocata* Say.

Terebra (*Oxymeris*) *gatunensis* Toula, Jahrbuch der K—K. Geol. Reichsanstalt Wien, vol. 58, p. 705, pl. 25, fig. 14, 1908.

Terebra gatunensis Brown and Pilsbry. Proc. Acad. Sci. Phila., pp. 339, 340, pl. 22, fig. 2, 1911.

Terebra (*Myurella*) *gatunensis* Cossmann, Jour. de Conchyliologie, vol. 61, pp. 13, 14, pl. 1, figs. 26-29, 1913.

Shell slender, tapering to a very acute spire, whorls of a decollate specimen 13, each whorl ornamented with a subsutural band about a quarter the width of the whorl. The band is marked off by a sulcus beneath which are typically seven, more often six, spiral cords. (The seventh frequently being concealed by the following volution). Transverse sculpture of many, very fine riblets which traverse the subsutural bands in a nearly vertical direction, but swing back slightly at the furrow, then become somewhat arcuate on crossing the seven spirals. Toula mentions twelve riblets on half a volution. This is the case with a diameter of 8.5 mm., that of Toula's specimen, which was a young shell; but the number of riblets increases on the later, larger whorls. Columella hardly plicate, but sharply keeled at the back.

Length of decollate shell 50 mm., greatest diameter 10.5 mm.

This species can easily be distinguised from *T. spirifera* and *T. cirrus* (of the *T. bipartita* group), which it resembles in sculpture, by their both possessing two sharp plications on the columella, while *gatunensis* is nearly smooth, with only a faint suggestion of a single fold. It is more difficult to discriminate be- *T. gatunensis* and some variations of *T. Wolfgangi*, as these two species are very closely allied.

T. gatunensis is found on the Isthmus at Gatun, Mindi, and Monkey Hill; and Cossmann refers a fragmentary shell from Martinique to this species.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao.

Terebra Wolfgangi Toula

Plate 4, Figure 6

Terebra dislocata Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 225, 1873. Specimens Gabb Coll. Cornell Paleont. Museum No. 7666. Not *T. dislocata* Say.

Terebra Wolfgangi Toula, Jahrbuch der K—K, Geol. Reichsanstalt Wien, vol. 58, pp. 705, 706, pl. 28, fig. 7, 1908.

Terebra Wolfgangi Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., pp. 340, 341, pl. 22, figs. 1, 3-6, 1911.

Shell slender, acute, resembling *T. gatunensis* in form and size; whorls of a decollate shell twelve; ornamentation on each whorl consisting of a subsutural band, occupying slightly less than one-third of the width of the whorl, and marked off by a furrow beneath which are five spiral cords (the fifth sometimes covered by the following whorl) extending to the suture of the next volution. A striking characteristic of this species is that the sub-sutural band is cut by several incised, revolving spiral lines which bisect or trisect the band. The transverse sculpture consists of many very fine riblets (about thirty-three on a whorl with a diameter of 8 mm). These cross the sub-sutural band in a slightly obliquely direction, are interrupted by the furrow, and become gently arcuate on crossing the five spiral cords. Length of decollate shell 40 mm., greatest diameter 8 mm.

Toula likens *T. Wolfgangi* to the recent *T. pertusa* Born; but on comparing our specimens with those of *T. pertusa* in the Newcomb collection, the relationship is evidently only a very general one. The species has a much closer resemblance to the fossil shells *T. gatunensis*, *spirifera* and *cirrus*. The last two can be quickly separated from *Wolfgangi* by their bi-plicate columellas; but it is more difficult to distinguish *Wolfgangi* from some forms of *gatunensis*. The tri- or bi-secting of the sub-sutural band in *Wolfgangi* is a useful guide.

A number of authors have reported *Wolfgangi* from the Isthmus. It is to be regretted that we obtained no specimens of this shell on our 1916 Expedition, and have only two collected by Professor Gabb without locality label further than Santo Domingo.

Terebra Berlineræ, n. sp.

Plate 4, Figures 7, 8

Shell slender and graceful, tapering to an acute spire, volutions rounded between the sub-sutural zones, which slightly constrict the shell. Whorls twelve to fourteen, the two nuclear smooth, the third and fourth ornamented with transverse riblets. The sub-sutural band begins to appear on the fifth and becomes defined on the sixth and seventh whorls. Spiral lines appear faintly on the fourth and fifth but do not become sharply defined until the eighth whorl. The sculpturing of the species is remarkably beautiful. It consists on all but the earliest whorls of the sub-sutural, constricting band occupying about one-fifth of the whorl and marked off by a narrow sulcus, below which are eight to ten narrow, flat spiral bands. Some of these may be sub-divided, forming many fine threads resulting in as many as fourteen or more spirals of different widths instead of the more typical eight or nine sub-equal spirals. Transverse sculpture of many very fine riblets, about thirty-six on a whorl having a diameter of 8 mm.; but the riblets may become more crowded and very close-set. Columella short, very sharply keeled at the back, anterior canal deeply notched. Length 38, greatest diameter 9 mm.

The species most closely resembling *T. Berlineræ* are *T. gatunensis* Toula and *T. cirrus* Dall; but it can at once be discriminated from these two species by its characteristically convex whorls, constricting sub-sutural bands and much closer, finer, and more delicate sculpture.

This, perhaps the most exquisite of all the Santo Domingo Tertiary fossils is dedicated to the memory of Mrs. Sarah Berliner.

Localities. — (Exp'd '16) Gravels, Rio Cana; Zones H and I, Rio Cana, near Caimito.

Genus CONUS Linné

Conus haytensis Sowerby

Plate 5, Figure 1

Conus Haytensis Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 44, 1849.

Conus Haitensis Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 231, 1873.

Conus Haitensis Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. p. 528, 1876.

Conus Haytensis Brown and Pilsbry, Proc. Acad. Nat. Sci., Phila., p. 341, 1911.

Shell very large, heavy, spire slightly elevated, spirally striate, sub-coronate; last whorl with a sub-angulate shoulder and striate base; canal slightly reflexed. A large shell measures 110×58 mm. This species is akin to *C. molis.* It is found at Bowden and Gatun.

Localities. — (Exp'd '16) Bluff 1, Cercado de Mao; Zone E, Rio Gurabo at Los Quemados; Zone H, Rio Cano at Caimito.

Conus haytensis var. *gurabensis*, n. var.

Plate 4, Figure 9

Shell large, solid; whorls about ten, the first three smooth, the two and a half following sculptured with many vertical, subequal riblets, interrupted by six small varices. The riblets and varices are crossed by close-set, fine revolving threads forming a somewhat cancellated ornamentation, quite different from the coronated spire of typical *haytensis.* The riblets then become obsolete, and the following three and a half whorls are ornamented only with the fine, delicate, sharply defined spirals. These decrease from fifteen or more and tend to become obsolete, so that the summit of the last whorl retains traces of only about five. Greatest diameter of shell 47 mm.

Locality. — (Exp'd '16) Zone B, Rio Gurabo at Los Quemados.

Conus molis Brown and Pilsbry

Conus molis Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila. p. 343, pl. 23, fig. 1, 1911.

This large, Gatun species measures 124×71 mm. One of a number of our puzzling Dominican cones very kindly examined by Dr. Dall was pronounced by him to be the young of *C. molis*. This adds another species to those common to the Isthmus and Santo Domingo.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao.

Conus Williamgabbi, n. sp.

Plate 5, Figure 2

Shell large, solid, conic; whorls twelve, the first two nuclear, the following five forming the acute apex of the spire, remaining volutions of the spire very flat, each ornamented with four or more revolving spiral threads and with feebler growth-striæ. Body whorl roundly carinated at the shoulder; upper portion smooth except for almost obsolete revolving striations, lower third ornamented with rather irregular, wavy spirals. Columella slightly plicate. Length 65, width 45 mm.

This fine Cone was among a number of specimens of *C. haytensis* sent by Professor Gabb, but its extremely flat spire and difference of form show it to be distinct. It was collected by Professor Gabb in Santo Domingo and is named in his honor.

Conus symmetricus Sowerby

Plate 7, Figure 7

Conus symmetricus Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 44, pl. 9, fig. 1, 1849.

Conus haitensis Gabb (in part), Trans. Amer. Phil. Soc.. vol. 15, p. 231, 1873.

Shell turbinate, short and broad, spire short, spirally striate; body whorl sharply carinate at the shoulder, ornamented with granulose spiral threads alternating with one or two finer smooth spirals; the canal is slightly produced and a trifle reflexed. Length of shell 29, greatest width 18 mm.

Locality. — (Exp'd '16) Zone E, Rio Gurabo at Los Quemados.

Conus symmetricus variety *domingensis* Sowerby

Plate 4, Figure 10

Conus Domingensis Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 45, 1849.

Conus Haitensis Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 231, 1873. Not. *C. haytensis* Sowerby.

Conus Haitensis Guppy (in part), Quart. Jour. Geol. Soc. London, vol. 32, p. 528, 1876.

Conus domingensis Dall, Trans. Wagner Inst. Sci., vol. 3. pt. 6, p. 1583, 1903.

Conus domingensis Brown and Pilsbry, Proc. Acad. Nat. Sci., Phila., p. 341, 1911.

Gabb and Guppy united Sowerby's *C. domingensis* with *C. symmetricus.* A specimen of the former species loaned by Dr. Dall from the National Museum shows it to be a flat-topped, broader shouldered mutation of *C. symmetricus.* This elegantly sculptured Cone is very common in Santo Domingo and is found at Bowden and Gatun.

Localities. — (Exp'd '16) Zones A, B, C, D, E, F, Rio Gurabo at Los Quemados; Bluff 1, Cercado de Mao.

Conus symmetricus variety *semiobsoletus*, n. var.

Plate 7, Figure 8

Shell resembling *C. symmetricus* in form but larger and with the granular spirals obsolete on the upper half of the body whorl. Length 39, greatest width 24 mm.

The specimens were collected by Professor Gabb in Santo Domingo.

Conus Sewalli, n. sp.

Plate 5, Figure 3; Plate 6, Figure 3

Shell rather large, sub-pyriform, spire short, acute; post-nuclear whorls about eleven, the first eight being spirally striate and delicately coronate, the last three are slightly channeled and strongly striated spirally; body whorl roundly angulate at the shoulder whence the sides slope convexly to the base, the ornamentation is limited to the lower two-thirds of the whorl and consists of beautiful, granular, spiral threads, the granules resembling the beads of a necklace; margin of outer lip nearly straight; posterior sinus rather deep; canal nearly straight. Length of largest shell 59, greatest width 33 mm.

Dr. Dall most kindly examined this shell and noted that it had no representative in the collection of the National Museum. Apparently it is new.

I take the greatest pleasure in naming this, our most exquisite Cone, in honor of Mr. Arthur Sewall of Philadelphia as a token of regard and gratitude for his encouragement and valuable help in assisting the progress of the Expedition.

Localities. — (Exp'd '16) Bluff 1, Cercado de Mao; Zone E. Rio Gurabo at Los Quemados.

Conus catenatus Sowerby

Plate 5, Figure 4; Plate 6, Figures 1, 2

Conus catenatus Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 45, pl. 9, fig. 2, 1849. (Young shell).
Conus interstinctus Guppy, Quart. Jour. Geol. Soc., vol. 22, p. 288, pl. 16, fig. 3, 1866. (Adult shell).
Conus catenatus Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 230, 1873.
Conus catenatus Gnppy, Quart. Jour. Geol. Soc., vol. 32, p. 527, 1876.

Heneken's shell chanced to be very young and Sowerby founded on it the species *catenatus*. Later Guppy described an adult specimen from Jamaica as *C. interstinctus*. We have a series of the following sizes: 30×15; 40×20; 57×27; 85×40 mm. The smallest of these is very like the original type figured by Sowerby. The largest Dr. Dall kindly compared with the type of Guppy's *interstinctus* and found it to be identical.

Localities. — (Exp'd '16) Zone A, Rio Gurabo at Los Quemados; Guayubin to Mao road at the ford of Rio Cana.

Conus stenostomus Sowerby

Plate 6, Figure 4

Conus stenostoma Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 44, 1849.
Conus stenostŏma Guppy, *Id.* vol. 22, p. 287, pl. 16, fig. 2, 1866.
Conus stenostoma Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 230, 1873.
Conus catenatus Guppy (in part), Quart. Jour. Geol. Soc. London, vol. 32, p. 527, 1876. Not *C. catenatus* Sowerby.
Conus stenostomus Dall, Trans. Wagner Inst., vol. 3, p. 6, p. 1583, 1903.

Shell characterized by a sharply angulated shoulder, narrow aperture, and profoundly sulcate posterior sinus. Our largest shell measures 62 × 34 mm.

This species has also been found at Bowden.

Localities. — (Exp'd '16) Bluff 1, Cercado de Mao; Zone B, Rio Gurabo at Los Quemados.

Conus consobrinus Sowerby

Plate 6, Figures 5, 6

Conus consobrinus Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 45, 1849.
Conus consobrinus Gabb (in part), Trans. Am. Phil. Soc., vol. 15, p. 229, 1873.
Conus consobrinus Guppy, Geological Magazine, London, New Series, Decade 2, vol. 1, pl. 17, fig. 3, 1874.
Conus consobrinus Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 527, 1876.
Conus consobrinus Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., p, 341, 1911.
Conus (*Chelyconus*) *consobrinus* Cossmann, Journ. de Conchyliologie, vol. 61, p. 46, pl. 3, figs. 17, 18, 1913.

This was one of the nine new Cones collected by Heneken in 1849. It has also been found at Bowden and Gatun.

Localities. — (Exp'd '16) Zones E and G, Rio Gurabo at Los Quemados.

Conus granozonatoides, n. sp.

Plate 6, Figure 7

Shell biconic, elongated, spire prominent, its earlier whorls coronate; whorls about thirteen, the nuclear smooth; the first eight post-nuclear ornamented by a row of many close-set tubercles near the base of each volution and, posterior to the tubercles, by several incised spiral lines, the tubercles become obsolete rather suddenly on the third volution from the last, but the spirals continue, becoming fainter until they fade out completely on the last whorl; body whorl with a roundly angulated shoulder whence it tapers to the base, marked by fine arcuate growth lines with occasional coarser resting stages; spiral sculpture of coarse, slightly granular threads strongest anteriorly, obsolete posteriorly; aperture narrow, outer lip when complete notched at the summit, then swinging forward in a broad curve, retracted at the base. Length of shell, 55, greatest width 24 mm.

Dr. Dall has very kindly examined this cone and pronouced it near Guppy's *C. granozonatus*.

Localities. — (Exp'd '16) Bluff 1, Cercado de Mao; Zones A and G, Rio Gurabo, near Los Quemados.

Conus gracilissimus Guppy

Plate 6, Figure 8

Conus gracilissimus Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 288, pl. 16, fig. 4, 1866.

Conus Orbignyi Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 230, 1873. Not *C. Orbignyi* Audouin 1830.

Conus gracilissimus Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 527, 1876.

Conus gracilissimus Dall, Trans. Wagner Inst. vol. 3, pt. 6, p. 1583.

Conus gracilissimus Cossmann, Journ. de Conchyliologie, vol. 61, pl. 4, fig. 13, 1913.

The three Cones, *C. gracilissimus*, *granozonatus* and *consobrinus*, are very closely related; and various authors have placed one or the other in synonymy. This is but one case of the intergradation of forms which is highly characteristic of the Dominican shells. One must either run very dissimilar forms together, as did Gabb, or to some extent ignore connecting links.

C. gracilissimus is widely distributed. Guppy found it at

Cumana, in the Manzanilla beds of Trinidad and at Bowden. Our shell measures 40 × 16 mm. It was collected by Gabb in Santo Domingo.

Conus tortuosostriatus Toula

Plate 6, Figure 9

Conus (*Chelyconus*) *tortuosostriatus* Toula, Jahrb. der K—K. Geol. Reichsanstalt Wien, vol. 61, p. 508, pl. 31, fig. 22, 1911.

Conus (*Hemiconus*) *tortuosostriatus* Cossmann, Journ. de Conchyliologie, vol. 61, p. 40, pl. 3, figs. 28, 29, 1913.

Shell slender, graceful; spire elevated; whorls about ten, the first two smooth, nuclear; post-nuclear whorls sharply carinate, denticulate, marked by strong arcuate growth-lines and several incised spiral lines. Body whorl ornamented with about twenty, narrow, flat spiral bands with narrower interspaces. Length 22, width 8 mm.

This pretty Cone is very near to *C. gracilissimus*, differing chiefly in the proportion of length to breadth, the ratio being approximately 3 to 1 against 2 to 1.

Localities. — (Exp'd '16) Zones G and E, Rio Gurabo at Los Quemados.

Conus ornatus (Gabb's name), n. sp.

Plate 6, Figure 10

Conus ornatus Gabb, MS. Specimen No. 7671 Cornell University Museum. No description found.

Shell of medium size, solid, spire very low, each of its volutions marked with four strong spiral threads and faint arcuate growth lines; body whorl sharply carinate, beneath the carina the sides slope slightly convexly and steeply to the base; ornamentation of about twenty-one very sharply incised spiral lines, obsolete on the upper fourth of the whorl. Length of shell 45, greatest width 27 mm.

Our specimen was collected by Gabb in Santo Domingo and labelled *C, ornatus*. I fail, however, to find any published description of this species.

Conus proteus Hwass

Plate 6, Figure 11

Conus proteus Hwass, Enc. Meth. vers, 1 pt. 2, p. 682, 1789.
Conus proteus ? Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 232, 1873.
? Conus Berghausii ? Gabb, *Id*. p. 232. Not of Hoernes, Foss. Wiener Beck. pl. 1, fig. 3.
Conus proteus Dall, Trans. Wagner Inst., vol. 3, pt. 1, p. 26, 1890.

Like the recent *C. proteus*, our fossils have four or five revolving rows of orange colored dashes, including less conspicuous, fainter, intervening rows. The proportions of one of our shells are like the recent, measuring 42×23 mm. But that figured is longer, measuring 51×27.

This species has lived on almost without change since the blue clays were accumulating on the sea floor. It is also found in the Florida Pliocene.

Localities. — (Exp'd '16) Zone H, Rio Cana at Caimito; Zone D, Rio Gurabo at Los Quemados.

Conus Vanattai, n. sp.

Plate 6, Figure 12

Shell solid, turbinate, the length twice the width; remaining whorls seven, their summits marked by arcuate growth-lines, not striate, slightly, broadly channeled; body whorl sharply carinate at the shoulder whence the sides taper evenly to the base, body sculptured with twelve raised, revolving threads 3 mm. apart at the center, closer at the base. Length of shell 40, greatest width 20 mm.

This shell was collected by Professor Gabb in Santo Domingo and thought by him to be a mutation of *C. planiliratus*, but it is evidently distinct. It is named in honor of Dr. E. G. Vanatta of the Philadelphia Academy.

Conus furvoides Gabb

Plate 7, Figures 1, 2

Conus furvoides Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 232, 1873.

Shell elongate, nearly or quite smooth, sometimes with a few wavy spirals anteriorly, spire acute, rather low, with the later whorls deeply channeled. Length 41, width 20 mm. Apparently this is Gabb's unfigured species.

One of our specimens from Cercado retains its delicate linear, revolving color pattern, of gray lines on a white background. The color scheme is of the general style of *C. lignarius* Reeve.

Localities. — (Exp'd '16) Bluff 2, Cercado de Mao; Zones H and I, Rio Cana at Caimito.

Conus Olssoni, n. sp.

Plate 7, Figure 3

Shell of medium size, very elongate, the length considerably more than twice the width; spire one-twelfth of the total length. Whorls eleven, the first two forming the protoconch rise abruptably above the following whorls, on which they rest like a minute but striking pinnacle visible to the unaided eye. The three whorls following the protoconch are flattened and discoidal, the subsequent six slope more rapidly towards the shoulder angle of the body whorl, they are convexly rounded between the deeply impressed suture lines, and marked with slightly arcuate, oblique growth-lines. The specimen described shows only very faint, nearly obsolete striæ on the spire. Body whorl roundly angulated at the shoulder, thence tapering evenly and gradually to the base, smooth except for a few irregular, more or less obsolete basal striæ. Length 38, width 16 mm.

This species is named in honor of Mr. Axel Olsson, by whom it was collected.

Locality. — (Exp'd '16) Zone D, Rio Gurabo at Los Quemados.

Conus cercadensis, n. sp.

Plate 7, Figure 4

Shell short, broad, solid, ficiform; nuclear whorls two; first four post-nuclear whorls with a well-defined. slightly overhanging carina; subsequent four or five whorls broadly channeled, the channeling being most apparent on the summit of the last whorl; spire with no trace of spiral striæ, but sharply marked by arcuate growth-lines; body whorl markedly convex below the shoulder carina, giving the shell its characteristic fig-shaped form; the sculpture of the last whorl consists of a varying number of spiral ridges, strongest anteriorly, fading out more or less posteriorly; some adult shells have the upper half of the body whorl nearly or quite smooth, while in others it is striate to the shoulder; aperture rather wide, posterior sinus deep. The relative proportion of breadth to height varies as follows: 27 × 16, 28 × 18, 29 × 20, 35 × 23 mm.

Our specimens are identical with some labelled by Gabb *C. cedo-nulli?* But they are not the true *C. cedo-nulli* of Hwass.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao. (Abundant and characteristic.

Conus Kitteredgei, n. sp.

Plate 7, Figures 5, 6

Shell with a short, acute, very concave spire, one-seventh the length of the shell, which is less than twice the width; earliest two post-nuclear whorls faintly crenulate, the following three slightly carinate; a channel appears on the penultimate volution of the spire and on the last becomes well marked; spiral striæ absent, the spire being smooth except for arcuate growth-lines; body whorl roundly angulated at the shoulder, the sides sloping convexly to a rather broad base; upper two-fifths of the last whorl typically nearly smooth, showing only faint, obsolete spiral striations; lower three-fifths with well-spaced, narrow ridges; aperture wide; outer lip sharp; posterior notch deep. Length of shell 31, greatest width 17 mm.

We have specimens with the ridges extending almost or quite to the shoulder of the body whorl (fig. 6). These appear to be a variety. They were found in the same zones as the typical shells.

This species is closest to *C. cercadensis*, from which it can be distinguished by the concave spire and the much less convexity of the body whorl below the shoulder. They were analogous species, — *C. cercadensis* being characteristic of the Mao and *C. Kitteredgei* of the Cana Rio.

I take great pleasure in naming this species in honor of Mr. and Mrs. Kitteredge of Hastings-on-the-Hudson.

Localities. — (Exp'd '19) Zones H and I, Rio Cana at Caimito.

Conus recognitus Guppy

Plate 7, Figure 9

Conus solidus Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 45, 1849. Not *C. solidus* Sowerby, Zool. Proc. 1841: Conch. Illust. *Conus* No. 76, pl. 56, fig. 56.

Conus solidus Guppy, Quart. Jour. Geol. Soc., vol. 22, p. 287, pl. 16, fig. 1, 1866.

Conus recognitus Guppy, Proc. Sci. Assoc. Trinidad, p. 171, 1867.

Conus pyriformis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 229, 1873. Not *C. pyriformis* Reeve, Conch. Icon., vol. 1, pl. 13, fig. 70, 1843.

Conus recognitus Guppy, Quart, Jour. Geol. Soc. London, vol. 32, p. 527, 1876.

Conus recognitus Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1583, 1903.

The recent *C. pyriformis* is the descendant of migrants through the Isthmus to the West Coast.

Conus recognitus also occurs at Bowden.

Localities. — (Exp'd '16) Bluff 3, Cercado de Mao; Zone D, Rio Gurabo at Los Quemados; Zones H and I, Rio Cano at Caimito.

Conus planiliratus Sowerby

Plate 7, Figure 10

Conus planiliratus Sowerby, Quart. Jour. Geol. Soc. London. vol. 6, p. 44, 1849.

Conus planiliratus Guppy, *Idem*, vol. 22, p. 287, pl. 16, fig. 7, 1866.

Conus planiliratus Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p

230, 1873.

Conus planiliratus Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 528, 1876.

Conus planiliratus Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1583, 1903.

Cf. *Conus planiliratus* Cossmann, Journ. de Conchyliologie, vol. 61, p. 48, pl. 3, figs. 25, 26, 27, 1913.

Shell characterized by its concave spire and last whorl sculptured with twenty prominent bands, alternating with sulcate interspaces lightly striated longitudinally. Length 34, width 15 mm.

Sowerby's recent *C. planiliratus* (Proc. Zool. Soc., p. 255, pl. 22, fig. 1) is altogether different. The fossil species occurs in the Caroni Series, Trinidad, and at Bowden. The type locality is Santo Domingo. The recent *C. Stearnsii* Conrad may be a descendant.

Conus marginatus Sowerby

Plate 7, Figure 11

Conus marginatus Sowerby, Quart. Jour. Geol. Soc, London, vol. 6, p. 44, 1849.

Conus marginatus Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 230, 1873.

Conus marginatus Guppy, Quart. Jour. Geol. Soc. London, vol. 32. p. 528, pl. 29, fig. 5, 1876.

Cf. *Conus* (*Chelyconus*) *marginatus* Cossmann, Journ. de Conchyliologie, vol. 61, pp. 44-46, pl. 3. figs. 14, 15, 1913.

Shell small, broad and short, spire high, carinate, not coronate; last whorl deeply sculptured with about sixteen alternating, narrow bands and grooves, the latter marked with longitudinal striæ. Length 19, width 11 mm.

The nearest ally is *C. gaza*. Guppy reported *C. marginatus* from the Manzanilla beds, Trinidad.

Localities. — (Exp'd '16) Zones D and G, Rio Gurabo at Los Quemados.

Conus gaza Johnson and Pilsbry

Plate 7, Figure 12

Conus gaza Johnson and Pilsbry, Proc. Acad. Nat. Sci. Phila., p. 342, pl. 23, figs. 2, 3, 1911.

Shell biconic, spire about one-third of the total length, diameter one-half the length; post-nuclear whorls about nine, lower edge of each carinate, last whorl sharply angulate at the shoulder, sculptured with twenty to twenty-two flattened ridges alternating with grooves striated by lines of growth. Length 25, width 14 mm.

Our specimens show but one tuberculated post-nuclear whorl. This is said to be characteristic of the Dominican representation of the species, while the Isthmian have two tuberculate whorls immediately following the nuclear.

Locality. — (Exp'd '16) Bluff 1, Cercado de Mao.

Conus Bonaczyi Gabb

Plate 7, Figure 13

Shell small, its sides curved, tapering gradually to the base; shoulder angle rounded, spire low, acute, its sides concave; body whorl ornamented by alternating grooves and flat or slightly rounded ridges, the grooves are marked by longitudinal growth-striæ but the ridges are smooth. Length of shell 25, greatest width 11 mm.

This species has never before been figured and we have no metatype, but our shells answer to the description of *C. Bonaczyi.*

Locality. — (Exp'd '16) Zone G, Rio Gurabo at Los Quemados.

Conus Karlschmidti, n. sp.

Plate 7, Figure 14

Shell of moderate size, length just twice the width; spire prominent, acute, one-fourth the total length in younger shells, less prominent in adult specimens; post-nuclear whorls about nine, of these the first two and a half are very finely coronate and the first four carinate, the subsequent spiral volutions are marked by spiral threads and by arcuate growth-lines; body whorl sharply angulate at the shoulder, from which the sides slope slightly convexly to the base, ornamented from shoulder to base by close-set spiral threads, sub-equal and numbering about thirty-five. Length of largest shell 32, greatest width 16 mm.

The young and relatively higher spired shells approach *C. imitator* Brown and Pilsbry, but differ in sculpture. This species is dedicated to Mr. Karl Schmidt, by whom it was found.

Localities. — (Exp'd '16) Bluff 1. Cercado de Mao; Zone E, Rio Gurabo at Los Quemados.

Conus Dalli Toula

Plate 7, Figure 15

Cf. *Conus spec.* Toula, Jahrb. der K—K. Geol. Reichsanstalt, Wien, vol. 58, p. 710, pl. 25, fig. 18, 1908. (Fragment).

Conus Dalli Toula, *Idem*, vol. 61, p. 508, pl. 31, fig. 23 a-d, 1911.

Conus (*Lithoconus*) *Dalli* Cossmann, Journ. de Conchyliologie. vol. 61, p. 41, pl. 3, figs. 30, 31, pl. 4, figs. 7, 8, 1913.

Shell conic, whorls about nine, the nuclear smooth; subsequent volutions of the spire marked by three or four impressed spiral lines and arcuate growth-lines. Shoulder of body whorl very sharply carinate; upper portion nearly smooth, lower portion ornamented with a varying number of narrow, flat bands tending to alternate with fine spiral threads. Length 23, width 11 mm. Collected by Gabb in Santo Domingo.

Genus SURCULA H. and A. Adams

Surcula jaquensis Sowerby

Plate 8, Figure 1

Pleurotoma Jaquensis Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 51, 1849.

Turris (*Surcula*) *Henekeni* Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 207, 1873. Not *T. Henekeni* Sowerby.

Pleurotoma Henekeni Guppy (in part), Quart. Jour. Geol. Soc., vol. 32, p. 526, 1876.

Shell with about eight whorls, marked posteriorly by a broad sub-sutural fasciole smooth except for arcuate growth-striæ, below this fasciole the whorls are ornamented with strong, rounded, longitudinal ribs numbering nine on the last volution, and with coarse spiral threads, about six on the penultimate whorl. Length of decollate shell 49, greatest width 17 mm.

Our specimens were collected by Gabb in Santo Domingo.

Surcula labiata Gabb

Plate 8, Figure 2

Clavatula labiata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 209, 1873.
Clavatula labiata Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 74, pl. 28, fig. 3, 1876.

Shell with nine whorls, the first two nuclear, the third vertically ribbed; subsequent whorls with a deep sub-sutural channel beneath which the whorl is angulated, bearing on the carina about ten oblique tubercles which become obsolete on the latter part of the last volution; outer lip rugose internally, very arcuate, margin thickened, lip-sinus very deep, situated *above* the carina. Length 20, width 9 mm.

Localities. — (Exp'd '16) Zones D and E, Rio Gurabo at Los Quemados.

Surcula riomaonis, n. sp.

Plate 8, Figure 3

Shell slender, fusiform, with a smooth, glassy two-whorled protoconch, and six post-nuclear whorls; the latter part of the protoconch and the first whorl of the post-embryonic shell are distinctly carinated; subsequent whorls gently convex; longitudinal sculpture of rounded ribs, arcuate on the body whorl, and numbering about nine on that and the penultimate volution; the ribs do not cross the narrow sub-sutural channels, which are marked only by rather heavy, raised, slightly arcuate growth-lines; spiral sculpture of fine, uniform raised threads, absent only from the sub-sutural channels; aperture rather long;

canal somewhat reflexed; posterior sinus very shallow, lying close to the suture. Length 13, width 4 mm.

Locality.— (Exp'd '16) Bluff 1, Cercado de Mao.

Genus TURRIS Bolten

Turris albida Perry

Plate 8, Figures 4-8

Pleurotoma albida Perry, Conch. Expl., pl. 32, fig. 4, 1811.

Pleurotoma virgo Lamarck, An. s. Vert., vol. 7, p. 94, 1822.

Pleurotoma cochlearis Conrad, Jour. Acad. Nat. Sci. Phila., 2d ser., vol. 1, p. 115, pl. 11, fig. 23, 1848.

Pleurotoma haitensis Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 50, 1849.

Pleurotoma virgo Moore, Quart. Jour., vol. 9, p. 130, 1853.

Pleurotoma barretti Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 290, pl. 17, fig. 6, 1866.

Pleurotoma antillarum Crosse, Journ. de Conchyliologie, vol. 13, p. 34, pl. 1, fig. 8, 1865. (Not of d'Orbigny).

Turris (*Surcula*) *virgo* Gabb, Trans. Amer. Phil. Soc., vol. 15, pp. 206, 207, 1873.

Pleurotoma albida Dall, Bull. Mus. Comp. Zoology Harvard Coll., vol, 18, pp. 72, 73, 1889; Trans. Wagner Inst., vol. 3. pt. 1, p. 28, pl. 4, fig. 8a, 1890.

Pleurotoma albida var. *tellea* Dall, Bull. Mus. Comp. Zoology Harvard Coll., vol. 18, p. 73, 1889.

Pleurotoma albida Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., p. 343, 1911.

Pleurotoma haitensis Cossmann, Journ. de Conchyliologie, vol. 61, pp. 16-18, pl. 2, figs. 1-4, 1913.

Pleurotoma cf. *antillarum* Cossmann, Journ. de Conchyliologie, vol. 61, p. 18, pl. 2, figs. 5, 6, 1913.

Turris albida Dall, Bull 90 U. S. Nat. Museum, p. 38, pl. 5, fig. 13, pl. 14, fig. 7, 1915.

Our Santo Domingo specimens represent five mutations:— (1) *Turris albida haitensis* (fig. 4), which corresponds with Sowerby's type and with Chipolan shells from Florida; (2) *T. albida Barretti* (fig. 5), a handsome variety described by Guppy from

Jamaica; (3) *T. albida virgo* (fig. 6); (4) *T. albida tellea* (fig. 7); (5) *T. albida antillarum* (fig. 8).

This species ranges from the Vicksburg Oligocene to the recent. It occurs as a fossil at Bowden, Cumana, Gatun and elsewhere.

Localities. — (Exp'd '16) Bluffs 1 (abundant), 2 and 3, Cercado de Mao; Zones A,B,E,F, Rio Gurabo at Los Quemados; Zone I, Rio Cana at Caimito; between Hato Viejo and Potrero, Rio Amina. Varietal forms: *T. albida tellea*, Zone A, Rio Gurabo; *T. albida virgo*, Zone I, Rio Cana; *T. albida antillarum*, Zones A, B, Rio Gurabo; Bluff 1, Cercado de Mao.

Genus BORSONIA Bellardi

Borsonia varicosa Sowerby

Plate 8, Figure 9

Cordiera varicosa Sowerby *fide* Gabb, Trans. Amer. Phil. Soc., vol, 15, p. 210, 1873.

Our specimen was collected by Gabb in Santo Domingo. It has the biplicate columella and characteristic notch of *Borsonia*. The present members of this genus are living in the abyssal zone of the Antilles.

Genus DRILLIA Gray

Drillia fusiformis Gabb

Plate 8, Figures 10, 11

Derfancia fusiformis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 209, 1873.

Drillia (*Crassispira*) *Henekeni* Cossmann, Journ. de Conchyliologie, vol. 61, pl. 3, figs. 10, 11, 1913. Not *D. Henekeni* Sowerby.

The Gatun analogue of this shell is *D. Zooki* Brown and Pilsbry. We have several metatypes of the Dominican species.

Locality. — (Exp'd '16) Zone B, Rio Gurabo at Los Quemados.

Drillia cercadonis, n. sp.

Plate 8, Figure 12

Shell slenderly fusiform, whorls ornamented with longitudinal undulating ribs, about nine on the last two whorls, not extending to the posterior suture; the suture is well defined, linear, edged by a sharp, raised spiral thread forming the upper border of the sub-sutural channel which is perfectly smooth except for delicate, microscopic, arcuate growth-lines; spiral sculpture of fine, sub-equal, sub-equidistant raised spiral threads crossing ribs and interspaces. Length 32, width 9 mm.

This species can be differentiated from *D. fusiformis* by its broad, smooth sub-sutural channel, and its finer, more uniform spirals. The Gatun analogue of this species is *Drillia fusinus* Brown and Pilsbry

Locality. — (Exp'd '16) Bluff 1, Cercado de Mao (rare).

Drillia venusta Sowerby

Plate 8, Figures 13, 14

Pleurotoma venusta Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 50, pl. 10, fig. 7, 1849.

Pleurotoma venustum Guppy, Quart. Jour. Geol. Soc., vol. 22, p. 289. 1866.

Turris (*Drillia*) *venusta* Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 208, 1873.

Pleurotoma venusta Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 527, 1876.

Pleurotoma venusta Guppy and Dall, Proc. U. S. Nat. Museum, vol. 19, no. 1110, p. 305, 1896.

At first glance our Chipolan specimens of *D. jamaicensis* appear identical with the Dominican shells, but the spiral sculpture of the former consists of groovings, and of the latter of raised narrow bands. *D. venusta* occurs at Bowden and Pointapier, Trinidad.

Localities. — (Exp'd '16) Bluff 1, Cercado de Mao (abundant); Zones B, D, E, Rio Gurabo at Los Quemados; Rio Amina between Potrero and Hato Viejo.

Drillia consors Sowerby

Plate 8, Figures 15, 16

Pleurotoma consors Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 50, 1849.

Pleurotoma consors Guppy, Quart. Jour. Geol. Soc., vol. 22, p. 280, 1866.

Turris (*Drillia*) *militaris* Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 207, 1873. Not *D. militaris* Hinds, Proc. Zool. Soc., p. 38, 1843.

Pleurotoma consors Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 527, 1876.

Pleurotoma sp. aff. Pl. alesidota (*Dall*) *var. macilenta* Toula, Jahrbuch der K—K. Geol. Reichsanstalt Wien, vol. 61, p. 506, pl. 30, fig. 11, 1911. Not *alesidota* var. *macilenta* Dall 1889.

Drillia consors Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., p. 345, 1911.

Drillia consors Cossmann, Journ. de Conchyliologie, vol. 61, pp. 20-22, pl. 2. figs. 8-14, 1913.

This shell has a slight resemblance to *D. militaris* Hinds from Panama; but is very like *D. alsidota macilenta* Dall dredged by the *Blake* off Barbados at 103 fathoms. This slender deep sea shell is apparently the descendant of our fossil.

D. consors occurs at Bowden, Gatun, Mindi, and Martinique. The type locality is Santo Domingo.

Locality. — (Exp'd '16) Zone A, Rio Gurabo at Los Quemados. (Rather common).

Drillia Henekeni Sowerby

Plate 8, Figures 17, 18

Pleurotoma Henikeri Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 50, pl. 10, fig. 6, 1849.

Turris (*Surcula*) *Henekeni* Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 207, 1873. Exclude *jaquensis* from synonymy.

Pleurotoma henekeni Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 526, 1876. Exclude *jaquensis*.

Not *Drillia henekeni* Cossmann, Journ. de Conchyliologie, vol. 61, pl. 3, figs. 10, 11, 1913. (=*D. fusiformis* Gabb).

Colonel Heneken's name was erroneously thought to be Henekeri when he sent his first collection to the Geological

Society. This large *Drillia* named for him by Sowerby has also been found at Bowden.

Localities. — (Exp'd '16) Bluffs 1 and 3, Cercado de Mao.

Drillia squamosa Gabb

Plate 9, Figure 1

Turris (*Drillia*) *squamosa* Gabb, Trans. Amer. Phil. Soc., vol. 15, pp. 208, 209, 1873.

Pleurotoma squamosa Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 527. pl. 29. fig. 7, 1876.

This striking *Drillia* is easily recognized by its bold, oblique, sharp-edged ribs, and its squamose surface. We have metatypes and some fine specimens of our own. The shell has not been found outside of Santo Domingo.

Locality. — (Exp'd '16) Zone B, Rio Gurabo at Los Quemados.

Drillia riogurabonis, n. sp.

Plate 9, Figure 2

Shell with three smooth nuclear and five post-nuclear whorls, ornamented with rather sharp longitudinal ribs of which there are ten on the body whorl, the last rib being thickened, forming a small varix; the ribs extend from suture to suture; spiral sculpture of faint striæ almost obsolete except on the anterior part of the shell; margin of outer lip thin, the external varix lying a short distance back of the lip; posterior sinus deep, narrow, adjoining the suture; anterior canal bent slightly forward as though deformed. Length of shell 9, greatest width 3.50 mm. Largest specimen measures 11 × 4.50 mm.

This species is the same general type as the recent, smaller *D. lissotropis* Dall, dredged by the *Blake* among the Antilles in 127-248 fathoms.

Locality. — (Exp'd '16) Zone D, Rio Gurabo near Los Quemados.

Drillia cf. *magnoliana* Olsson

We have a single worn shell from Zone I, Rio Cana, near Caimito, which is of the same general type as *D. magnoliana* Olsson, from the Late Miocene of the Natural Well, Duplin County, North Carolina. Unfortunately, our shell it too eroded for an exact comparison.

Drillia losquemadica, n. sp.

Plate 9, Figure 3

Shell of moderate size, with nine whorls, the last sometimes bearing a varix; first two volutions smooth, convex, nuclear; subsequent volutions separated by a distinct linear, wavy suture, beneath which is a raised spiral thread bordering the posterior edge of the sub-sutural fasciole; whorls sculptured below the fasciole with straight, longitudinal ribs numbering fifteen on the last whorl; the ribs do not cross the fasciole; spiral sculpture of flattened threads (six on the penultimate and about twenty on the ultimate whorl) crossing ribs and interspaces; posterior sinus U-shaped, well-defined in adult shells; outer lip thin with about half a dozen strong liræ far within. Length of largest shell 19, greatest width 6.50 mm.

Locality. — (Exp'd '16) Zone D, Rio Gurabo near Los Quemados.

Drillia Donalbertonis, n. sp.

Plate 9, Figure 4

Shell rather small, solid, with two smooth, nuclear whorls; post-nuclear volutions seven, boldly sculptured with strong, rounded, straight, longitudinal ribs (fifteen on the last whorl) cut short by the broad, conspicuous sub-sutural fasciole which equals nearly one-half of the axial width of the whorls of the spire; spiral sculpture of somewhat stronger threads alternating with groups of finer lines; the spirals extend over the ribs, interspaces and sub-sutural fasciole, the posterior edge of which is bordered by a slightly stronger spiral; outer lip thin, with an external varix behind it; canal short, reflexed. Length of shell 13.5, greatest width 5 mm.

Locality. — (Exp'd '16) Zone D, Rio Gurabo near Los Quemados.

Drillia maonisriparum, n. sp.

Plate 9, Figure 5

Shell with three nuclear whorls, the first two smooth, the third ribbed; post-nuclear whorls five, separated by a linear suture, beneath which is a prominent spiral ridge forming the upper border of the sub-sutural channel; the latter is marked by arcuate growth-lines and several fine spiral threads; below the sub-sutural channel the whorls are sculptured by about fifteen rather sharp, straight, longitudinal ribs, several of which may be replaced on the body whorl by a single rounded varix; in the interspaces between the ribs are numerous spiral threads which cross the varix but not the crests of the ribs; the spirals extend to the base of the shell but the ribs terminate below the convexity of the body; outer lip sharp; posterior sinus deep, small, circular. Length 9.5, width 4 mm.

Localities. — (Exp'd '16) Bluff 2 (rare), Bluff 3 (fairly common), Cercado de Mao.

Drillia hispaniolæ, n. sp.

Plate 9, Figure 6

Shell small, slender, graceful, with eight whorls, the first two smooth nuclear, post-nuclear whorls six, ornamented by close, rounded, slightly arcuate, longitudinal ribs of which there are twelve and a rounded varix on the last whorl; the ribs stop short at the anterior edge of the narrow sub-sutural channel, which is bordered on its posterior edge by an inconspicuous spiral ridge; spiral sculpture of equal, equidistant threads which cross the crests of the ribs as well as the interspaces and varix; posterior sinus deep, narrow, U-shaped; outer lip sharp. Length 9.5, width 3.25 mm.

This shell can be distinguished from *D. maonisriparum* by its two-whorled protoconch, rounded ribs crossed by the spirals, and U-shaped sinus.

Locality. — (Exp'd '16) Zone D, Rio Gurabo at Los Quemados.

Drillia islalindæ, n. sp.

Plate 9, Figure 7

Shell with a single varix on the latter half of the body whorl beyond which the sculpture changes from ribbed to subcancellate; post-nuclear whorls with narrow, sharp, oblique ribs, fourteen on the penultimate whorl, present on the first half of the body whorl where extra ribs may be intercalated; spiral sculpture of incised lines not crossing the ribs; sub-sutural fasciole channeled on the last half of the body whorl and marked by raised growth- lines; outer and inner lips smooth; sinus deep, U-shaped. Length 15, width 5.5 mm.

Localities. — (Exp'd '16) Zone G, Rio Gurabo at Los Quemados; Zone I, Rio Cana at Caimito. Varietal form, Bluff 1, Cercado de Mao.

Genus CLAVA Martyn

Clava plebeia Sowerby

Plate 9, Figure 8

Cerithium plebeium Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 51, 1849.

Cerithium plebeium Guppy, Quart. Jour., vol. 22, p. 290, pl. 16, fig. 9, 1866.

Cerithium plebeium Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 238, 1873.

Cerithium plebeium Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 519, 1876.

Clava plebeia Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 2, p. 290, 1892.

The type of this species was collected by Heneken in Santo Domingo and named by Sowerby. Later Guppy found it at Bowden, Cumana and Anguilla.

Localities. — (Exp'd '16) Zones B, D, E, F, G, Rio Gurabo at Los Quemados. (Common).

Genus MANGILIA Risso

Mangilia maoica, n. sp.

Plate 9, Figure 9

Shell small, turreted, nuclear whorls four, glassy, the last volution carinated and delicately longitudinally ribbed; post-nuclear whorls four, strongly carinated in young shells but in the adult the last whorl becomes gently rounded, losing the carina; in some specimens the entire surface is adorned with microscopic, frosty, beaded spiral threads alternating with still finer granular lines, in other shells the beaded spirals are inconspicuous over the general surface, but become progressively stronger on approaching the suture, the one bordering the suture being the strongest; whorls with ten undulating ribs, slightly tuberculate at the carina, extending from suture to suture; outer lip thickened in adult, sinus U-shaped, deep. Length 4, width 1.5 mm.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao.

Mangilia Lalonis, n. sp.

Plate 9, Figure 10

Shell with seven strongly carinate whorls, the first two nuclear, the apical being invariably set at an angle to the main axis of the shell, and the second strongly keeled and delicately ribbed as in the preceding species; post-nuclear whorls five, adorned with straight longitudinal ribs, extending from suture to suture, and numbering nine on the last whorl; spiral sculpture of frosty, beaded threads, with groups of two or three finer between the larger threads; in adult shells the posterior sinus is inconspicuous; outer lip not thickened. Length of shell 6, greatest width 2.5 mm.

Closely related to *M. maoica*, but in this shell the body whorl is strongly carinate, the ribs straight, the sinus inconspicuous. Also like *M. eritima* Bush, living off Hatteras, but the protoconchs are entirely different.

Localities. — (Exp'd '16) Bluff 2 (rare), Bluff 3 (very common), Cercado de Mao.

Genus CYTHARA Schumacher

Cythara gibba Guppy

Plate 9, Figure 11

Cythara gibba Guppy, Proc. U. S. Nat. Mus., vol. 19, no. 1110, p. 306, pl. 27, fig. 9, 1896.

Cythara gibba Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1583, 1903.

Shell small, with six shouldered whorls, the first two smooth; nuclear; post-nuclear whorls carinated, and with longitudinal ribs (ten on the body whorl), and rather distant spiral threads; posterior sinus very large and deep, U-shaped, lying close to the suture; outer lip much thickened and bearing within near the posterior sinus a single large denticle; anterior canal short. Length of shell 3.9, greatest width 2 mm.

Locality. — (Exp'd '16) Bluff 2, Cercado de Mao. (Very rare).

Cythara elongata Gabb

Plate 9, Figure 12

Mangilia elongata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 211, 1873; Jour. Acad. Sci. Phila., vol. 8, p. 351, pl. 46, fig, 34.

Cythara elongata Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1583, 1903.

Shell small, slender, whorls eight, the first three smooth, nuclear; post-nuclear whorls ornamented by six narrow, longitudinal ribs sub-continuous from whorl to whorl; interspaces broad, shallow; the last rib forms the varix of the outer lip; spiral sculpture absent; posterior sinus deep U-shaped ; aperture narrow; anterior canal short. Length of shell 6.50, greatest width 2 mm.

Type locality Santo Domingo. Also found at Bowden.

Localities. — (Exp'd '16) Bluffs 2 and 3, Cercado de Mao; Zone H, Rio Cana. (Very rare except at Bluff 3).

Cythara polygona Gabb

Plate 9, Figure 13

Mangilia polygona Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 211, 1873.

Shell small, gracefully fusiform, with seven whorls, the first three smooth, nuclear; subsequent four whorls ornamented with about seventeen delicate, slightly sinuous, longitudinal ribs with shallow concave interspaces crossed by very many close, fine, spiral threads; aperture long, rather narrow; inner lip smooth; outer lip with a single ill-defined denticle near the posterior sinus, which is rather shallowly U-shaped. Length of largest specimen 11, greatest width 4.5 mm.

Our shells appear to be Gabb's unfigured *C. polygona.*

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao. (Very abundant; about 200 shells were collected).

Cythara caimitica, n. sp.

Plate 9, Figure 14

Shell with seven whorls, the first three embryonic; post-nuclear whorls with narrow, sharp, longitudinal ribs (seventeen or eighteen on the last whorl), the last rib is represented by the varix bordering the outer lip; spiral sculpture of very faint, rather distant, microscopic incised lines; aperture medium; inner lip smooth; outer lip with a varix and a sharply defined internal longitudinal ridge which terminates in a denticle just anterior to the shallow posterior sinus. Length 10, width 5 mm.

This species resembles the shells referred to *C. polygona*, but differs as follows: — (1) The spirals are incised lines; (2) the lip has a varix externally and and a longitudinal ridge internally.

Locality. — (Exp'd '16) Zone I, Rio Cana, near Caimito.

Cythara cercadica, n. sp.

Plate 9, Figure 15

Shell fusiform, with seven whorls, the first two nuclear; post-nuclear whorls sculptured with narrow, sharp, nearly straight, longitudinal ribs of which there are nine on each of the last two whorls; interspaces wider, concave; entire surface marked by weak, incised, microscopic spiral lines which cross both interspaces and ribs, cutting the crests of the latter; outer lip broken away; inner lip smooth. Length of shell 14.50, greatest width 5.25 mm.

This species is of the general type of Dr. Dall's *C. terminula* from the Pliocene of Florida.

Gabb's *C. heptagona* is characterized by its seven prominent ribs.

Locality. — (Exp'd '16) Bluff 1, Cercado de Mao.

Genus GLYPHOSTOMA Gabb

Glyphostoma dentifera Gabb

Plate 9, Figure 16

Glyphostoma dentifera Gabb, Proc. Acad. Nat. Sci. Phila., vol. 24, p. 270, pl. 11, fig. 4, 1872.

Glyphostoma dentifera Gabb. Trans. Amer. Phil. Soc., vol. 15, p. 210, 1873.

The shell figured is a metatype of Gabb's. This species is the genotype of *Glyphostoma*.

Glyphostoma golfoyaquensis, n. sp.

Plate 9, Figure 17

Shell very slender and graceful; whorls ten, the first three nuclear, of these the first two are smooth and convex, the third very sharply carinate; post-nuclear whorls seven, the first two carinate, the remainder gently convex; suture linear; sub-sutural channel marked with extremely fine spiral striæ and coarse, conspicuous, raised arcuate growth-lines; whorls below the sub-sutural channel ornamented with rounded, longitudinal ribs with narrower interspaces, the ribs number thirteen or fourteen on the last two whorls; on the last whorl they tend to fade out and end in a single strong varix behind the outer lip; but additional ribs are intercalated, extending from the convexity of the body down towards the canal; spiral sculpture of uniform threads (four or five on the penultimate whorl) which cross ribs, interspaces, and varix, and extend to the base of the canal, but are replaced in the sub-sutural channel by the much finer striæ; outer lip with a thick external varix, margin thin, bearing within six minute denticles and one large posterior denticle; inner lip with a strong posterior denticle; columella with minute, sharp, transverse plicæ; sinus deep, narrow, sub-circular. Length 12, width 4.5 mm.

Locality. — (Exp'd '16) Zone I, Rio Cana, near Caimito.

Genus Clathurella Carpenter

Clathurella Vendryesiana Dall

Plate 9, Figure 18

Shell very slenderly fusiform, whorls eight, the first two smooth, the following slightly carinate, the third to the sixth have longitudinal riblets, later whorls only finely cancellated; lip thickened; sinus deep. Length 14, width 4.5 mm.

An exquisite shell described from Bowden and now found in Santo Domingo.

Locality. — (Exp'd '16) Zone D, Rio Gurabo at Los Quemados.

Genus Cancellaria Lamarck

Cancellaria Barretti Guppy

Plate 10, Figure 1

Cancellaria Barretti Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 289, pl. 17, fig. 11, 1866.

Cancellaria reticulata Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 236, 1873. Not *C. reticulata* Linné.

Cancellaria Barretti Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 520, 1876.

This is the præcursor of *C. reticulata* Linné, living in the Antilles. Its fossil analogues are *C. Conradiana* Dall, Florida Pliocene, and *C. Dariena* Toula, Gatun. Guppy's type was a Bowden shell.

Localities. — (Exp'd '16) Bluffs 1, 2 and 3, Cercado de Mao.

Cancellaria Rowelli Dall

Plate 10, Figure 2

Cancellaria Rowelli Dall, Proc. U. S. Nat. Mus., vol. 19, no. 1110, p. 307, pl. 29, fig. 1, 1896.

The type measured 25×13 mm. Its nearest ally is *C. urceolata* Hinds, living on the west coast of Central America.

Collected by Rowell at Potrero, Rio Amina.

Cancellaria epistomifera Guppy

Plate 10, Figures 3, 4, 5

Cancellaria Moorei Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 236, 1873. Not *C. Moorei* Guppy 1866.

Cancellaria epistomifera Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 520, pl. 28, fig. 9, 1876.

Cf. *Cancellaria dariena* var. Toula, Jahrb. der K-K. Geol. Reichsanstalt, Wien, vol. 58, p. 704, pl. 28, fig. 1, 1908.

Cancellaria epistomifera Cossmann, Journ. de Conchyliologie, vol. 61, pp. 53, 54, pl. 4, figs. 5, 6, 1913.

Our series is divisible into two sets: (1) Protoconch small, first two whorls smooth, the third developing riblets slightly before or simultaneously with the spiral threads; post-nuclear spirals strap-like; (2) Protoconch large, first two whorls smooth, the third developing five to seven spiral threads, preceding the riblets by a third of a volution; post-nuclear spirals sharp-edged. Dr. Dall compared (1) with the type and pronounced it the true *epistomifera* and suggested (2) might be a variety. Toula's *C. dariena* var. is very like *C. epistomifera*, but does not show the characteristic spout of the outer lip. M. Cossmann reports a fragment of *C. epistomifera* from Martinique. The type locality is Santo Domingo.

Localities. — (Exp'd '16) Bluffs 1 and 3, Cercado de Mao; Zone A, Rio Gurabo at Los Quemados.

Cancellaria lævescens Guppy

Plate 10, Figure 6

Cancellaria lævescens Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 289, pl. 17, fig. 12, 1866.

Cancellaria lævescens Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 239, 1873.

This species can be at once recognized by its characteristic loss of cancellate sculpture on the body whorl. Our shells were collected by Gabb in Santo Domingo.

Cancellaria Guppyi Gabb

Plate 10, Figures 7, 8

Cancellaria Guppyi Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 236, 1873.

This species can be recognized by its sub-globose form, channeled suture, and fine cancellation. We have several of Gabb's metatypes with which our shell appears identical though slightly larger and higher-spired.

Locality. — (Exp'd '16) Bluff 1, Cercado de Mao.

Cancellaria Harrisi, n. sp.

Plate 10, Figures 9, 10

Shell with eight whorls, the first two nuclear smooth, on the third riblets and spirals appear; the latter increase from striæ to flat, narrow bands, on the last two whorls alternating with finer secondary and sometimes tertiary spirals; on crossing the ribs the spirals at the shoulder are nodulose and beautifully coronate the whorls; the ribs number fourteen on the body whorl but on earlier volutions are more numerous; columella tri-plicate, the lowest fold bordering the anterior canal; outer lip fluted on the inner edge, lirate within. Length 30, of body whorl 22, width 16 mm.

Our shells have a slight resemblance to the recent Oriental *C. laticosta* Kuster.

This, the most beautiful of the Dominican Cancellarias, is named in honor of Professor G. D. Harris.

Localities. — (Exp'd '16) Zones H and I, Rio Cana at Caimito.

Cancellaria (*Trigonostoma*) *gurabis*, n. sp.

Plate 10, Figure 11

Cancellaria brevis Gabb, Trans. Amer. Phil. Soc., vol.15, p. 236, 1873. Not *C. brevis* Sowerby, Proc. Zool. Soc., p. 52, 1832; Thesaurus Conch. f. 21.

Shell excavately shouldered, widely and deeply umbilicated; whorls five, babylonic, the first two nuclear, smooth, glassy, the apical small, the second enlarging rapidly; the three post-nuclear whorls are cancellated by the intersection of numerous fine ribs and rather strong spiral ridges usually alternating with thinner spiral threads; in addition to the cancellate ornamentation, the penultimate whorl bears three, and the ultimate four, narrow varices somewhat more than twice as thick as the ribs; both ribs, varices, and spirals extend over the strong shoulder carina and across the excavated channel to the suture; they also extend into the funnel-like umbilicus; aperture sub-triangular; outer lip bordered externally by the fourth varix of the body whorl, the lip shows within faint groovings corresponding to the external spiral ridges; inner lip with two thread-like, distinct, rather distant plications. Length 11, width 8 mm.

Locality. — (Exp'd '16) Zone D, Rio Gurabo at Los Quemados.

Cancellaria (*Aphera*) *islacolonis*, n. sp.

Plate 10, Figure 12, a, b

Cancellaria tessellata Gabb, Trans. Amer. Phil. Soc., vol. 15, p, 236, 1873. Not *C. tessellata* Sowerby, Proc. Zool. Soc., p. 51, 1832.

Shell resembling the recent West Coast *C. tessellata* Sowerby; whorls six, the first two small, smooth, nuclear; post-nuclear whorls elegantly cancellated by the intersection of equal longitudinal riblets and revolving ridges; outer lip crenate on the margin, with about fourteen strong liræ within; entire inner lip overspread with a broad, margined callous plate; columella strongly biplicate, the folds often grooved, callus more or less wrinkled. Measurements: 14×7, 19×10 mm.

An exquisite and striking shell, abundant in the blue clays.

Localities. — (Exp'd '16) Bluffs 2 and 3 (abundant), Cercado de Mao; Zone G, Rio Gurabo at Los Quemados; Zone I, Rio Cana at Caimito.

Cancellaria (*Narona*) *losquemadica*, n. sp.

Plate 10, Figure 13

Shell with seven whorls, the first two smooth, glassy, nuclear, the apical small, the second swollen; five post-nuclear whorls gently convex, abruptly truncate and squarely shouldered posteriorly; longitudinal ornamentation of narrow, varix-like ribs (eleven on each or the last two whorls) extending from suture to suture and intensifying the angulation of the whorls; both the ribs and their interspaces are crossed by spiral threads, ten on the penultimate and twenty on the ultimate whorl; aperture sub-ovate, rounded posteriorly, produced anteriorly into a short canal which is continuous with the inner lip; the latter has a thin callus through which the spirals of the body are seen; columella with three plications, the two anterior proximate, parallel, the posterior more remote, sub-parallel, weaker; umbilicus represented by a mere chink. Length 13, width 7 mm.

This shell has a slight resemblance to the Gatun *C. decaptyx* Brown and Pilsbry, but is much more squarely shouldered, with more numerous ribs, and a triplicate columella.

Locality. — (Exp'd '16) Zone E, Rio Gurabo at Los Quemados.

(*B.*) *SUPER-FAMILY RHACHIGLOSSA*

Genus OLIVA Bruguière

Oliva cylindrica Sowerby

Plate 10, Figures 14, 14a

Oliva cylindrica Sowerby, Quart. Jour. Geol. Soc., vol. 6, p. 45, 1849.
Oliva reticularis Guppy, Quart. Jour. Geol. Soc., vol. 22, p. 288, 1866. Not *reticularis* Lamarck.
Oliva cylindrica Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 215, 1873.
Oliva cylindrica Guppy, Quart. Jour. Geol. Joc., vol. 32, p. 526, 1876.
Oliva cylindrica Dall, Trans. Wagner Inst., vol. 3, pt. 6, p. 1583, 1903.
Oliva cylindrica Cossmann, Journ. de Conchyliologie, vol. 61, p. 57, pl. 5, figs. 2, 3, 1913.

A comparison of specimens shows our fossils to be very close to the recent *O. reticularis* and *O. litterata*, but rather heavier, larger and broader.

Guppy reported *O. cylindrica* from the Isthmus, Cumana, Barbuda, Trinidad (Caroni Series); and Dall and Cossmann from Bowden. The type was collected by Heneken in Santo Domingo.

Localities. — (Exp'd '16) Bluff 1, Cercado de Mao; Zone G, Rio Gurabo at Los Quemados; Zones H and I, Rio Cana at Caimito.

Oliva Cristobalcoloni, n. sp.

Plate 10, Figure 15

Shell very slender, spire high, suture channeled; whorls eight, the first three nuclear, the initial extremely small, the second slightly larger, the third increasing suddenly; subsequent whorls sloping evenly to the tapering body; inner lip with many short, transverse, posterior plications and five or six longer anterior folds. Length 32, width 11.5 mm.

This species is distinguished from our other Olives by its very slender form, high spire, and extremely sloping shoulder. It is much narrower and more tapering than young shells of *O. cylindrica*, *reticularis*, or *litterata*.

Localities. — (Exp'd '16) Zones H and I, Rio Cana at Caimito.

Oliva brevispira Gabb

Plate 10, Figures 16, 17

Oliva brevispira Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 215, 1873.
Oliva Giraudi Cossmann, Journ. de Conchyliologie, vol. 61, p. 56, pl. 5, figs. 4-8, 1913. Exclude synonymy.

We have a large series agreeing with our metatype of Gabb's *O. brevispira* and with Cossmann's figures of *O. Giraudi* from Martinique. The latter only appears a trifle broader shouldered than the Dominican shells.

O. brevispira has a characteristic short spire; round, glassy, button-like protoconch; and inner lip with fifteen to sixteen plications.

Localities. — (Exp'd '16) Bluffs 2 and 3, Cercado de Mao (very abundant); Zone G, Rio Gurabo at Los Quemados; Zones H and I, Rio Cana at Caimito (abundant).

Genus OLIVELLA Swainson

Olivella muticoides Gabb

Plate 11, Figure 1

Oliva muticoides Gabb, Trans. Amer. Phil. Soc., vol. 315, p. 215, 1873.
Olivella mutica variety *muticoides* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 45, 1890.

This species is closely akin to the Miocene—Recent *O. mutica* Say, which is living on the Monte Cristi beach. It is also near to *O. Boussaci* Cossmann, from Martinique. Gabb's species has never been figured, but we have metatypes for comparison. The shell has not been found outside of Santo Domingo.

Localities. — (Exp'd '16) Zone G, Rio Gurabo at Los Quemados; Zone H, Rio Cana at Caimito.

Olivella muticoides variety *canaliculata* Gabb

Plate 11, Figure 2

Oliva canaliculata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 215, 1873.

This shell intergrades with *O. muticoides*, but our seven metatypes from Gabb show it is typically slightly broader, with a lower, more deeply channeled spire. It measures about 16×7 mm. *O. canaliculata* has never been figured heretofore. It has not been reported except from Santo Domingo.

Locality. — (Exp'd '16) Bluff 2, Cercado de Mao.

Olivella indivisa Guppy

Plate 11, Figure 3

Oliva oryza Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 215, 1873. Not *oryza* Lamarck.

Olivella indivisa Guppy, Proc. U. S. Nat. Museum, No. 1110, vol. 19, p. 308, pl. 30, fig. 10, 1896.

Our Dominican shells appear slightly more convex than Guppy's Bowden type, but otherwise coincide with his figure of *O. indivisa.* This shell is the præcursor of the recent *O. oryza* (=*nivea* Gmelin).

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao. (Extremely abundant).

Olivella Sancti-Dominici, n. sp.

Plate 11, Figure 4

Shell elongate-ovate, highly polished, spire short, blunt; whorls about four, the apical button-like, the second nearly covered by the third; last whorl very cylindrical; columellar callus, thin, anterior plications two, distinct, followed by a number of delicate transverse striæ. Length 12, width 5 mm.

This species appears to be the ancestor of *O. jaspidea* Gmelin, now living on the Monte Cristi beach, but the spire is higher and the body more ventricose in the recent shell.

Dall cites a Bowden *Olivella* near *jaspidea*, possibly like ours.

Locality. — (Exp'd '16) Zone D, Rio Gurabo at Los Quemados.

Genus MARGINELLA Lamarck

Marginella coniformis Sowerby

Plate 11, Figures 5, 5a

Marginella coniformis Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 44, 1849.

Marginella coniformis Guppy, Quart, Jour. Geol. Soc., vol. 22, p. 288, pl. 17, fig. 2, 1866.

Marginella coniformis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 221, 1873.

Marginella coniformis Guppy, Quart. Jour. Geol. Soc. vol. 32, p. 528, 1876.

Marginella coniformis Guppy and Dall, Proc. U. S. Nat. Mus., vol. 19, no. 1110, p. 309, 1896.

? *Marginella coniformis* Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., p. 348, pl. 24, fig. 12, 1911.

This is the commonest Dominican *Marginella*. Large shells measure 25 × 13.5 mm. Guppy's Cumana specimen is *M. cincta* Kiener, and that from the Caroni series, Trinidad, is *Persicula* near *obesa*. It does, however, occur at Bowden and Gatun; but Brown and Pilsbry's figure of a variety also from Gatun is remarkably unlike Guppy's illustration of *M. coniformis*.

The Dominican fossil is undoubtedly the ancestor of the shorter and more cylindrical *M. guttata* Dillwyn, living in the West Indies.

Localities. — (Exp'd '16) Bluff 1, Cercado de Mao; Zones D and E, Rio Gurabo at Los Quemados.

Marginella Christineladdæ, n. sp,

Plate 11, Figure 6

Shell slender, elongate, four-whorled, smooth and polished, spire very low; aperture nearly as long as the shell, narrow; margin of outer lip thickened, smooth within; inner lip of adult shells with a thin callus extending to the tip of the spire, columella with four plications, the three anterior oblique, the posterior transverse, lying at the center of the inner lip. Length of largest shell 19, width 9 mm.

The nearest fossil ally is the larger, Pliocene, *M. limonensis* Dall, from Costa Rica. The recent analogue and probable descendant is *M. oblonga* Swainson, living off the Bahamas.

This species is named in honor of Mrs. Christine-Ladd Franklin of New York City, Chairman of the Sarah Berliner Fellowship Committee. It is a slight token of appreciation of her confidence from the beginning in the writer, and in the success of the Santo Domingo Expedition.

Locality. — (Exp'd '16) Zone B, Rio Gurabo at Los Quemados.

Marginella maoensis, n. sp.

Plate 11, Figure 7

Shell oblong-ovate, resembling *M. apicina* Menke in form, but about half as large, with a slightly more prominent spire, and with the body-whorl convex, not medially contracted as in *apicina*. Whorls four, suture obscure; aperture narrow, widening anteriorly and somewhat abruptly expanding posteriorly; outer lip heavily thickened except anteriorly, closely and finely crenulate within; columella with four plications, the two anterior stronger, longer, oblique, the two posterior weaker, nearly transverse. Color pattern consisting of two narrow, well-defined dark-gray bands, one almost central, the other anterior, thus dividing the body whorl into three subequal zones; no spots are present. Length 10, width 6 mm.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao. (Abundant).

Marginella Sowerbyi Gabb

Marginella Sowerbyi Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 221, 1873.

Marginella Sowerbyi Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 528, pl. 28, fig. 1, 1876.

Characterized by a high spire and grooved columellar folds. The shell measures 15 × 11.50. Collected by Gabb in Santo Domingo.

Marginella hispaniolana, n. sp.

Plate 11, Figure 8

Shell small, short-biconic, smooth and polished, with four whorls; suture indistinct, spire enameled; outer lip bordered by a narrow, thick band, sharply lined off from the body whorl; this band continues around the base of the shell, bordering and reinforcing the canal; margin of outer lip strongly crenulate, bearing about fifteen denticles; inner lip with four sharp, prominent folds, the two anterior being stronger, longer, and more oblique, the two posterior shorter, nearly transverse. Length of shell 8, aperture 6, greatest width 5 m. m.

This species is smaller and more squarely shouldered than *M. Sowerbyi*. It recalls *M. Newmani* Dall from the Tampa silex bed.

Locality. — (Exp'd '16) Zone G, Rio Gurabo at Los Quemados.

Marginella latissima Dall

Marginella latissima Dall, Proc. U. S. Nat. Mus., vol. 19, no. 1110, pp. 308, 309, pl. 29, fig. 11, 1896.

Found by Gabb in the Costa Rica Pliocene and collected by Bland in Santo Domingo.

Marginella amina Dall

Marginella amina Dall, Proc. U. S. Nat. Mus., vol. 19, no. 1110, p. 309, pl. 29, fig. 15, 1896.

Collected by Bland at Potrero, Rio Amina.

Marginella domingoensis Dall

Marginella domingoenses Dall, Proc. U. S. Nat. Mus., vol. 19, no. 1110, p. 310, 1896.

Collected on an island in Lake Henriquillo, southern Santo Domingo, and also by Bland at Potrero, Rio Amina.

Marginella (*Persicula*) *cercadensis*, n. sp.

Plate 11, Figure 9

Shell small, ovate, Bulliform, spire depressed, enameled; margin of outer lip thickened, sharply lined off from the body whorl by a narrow sulcus; base of shell keeled, the keel being continuous with the thickened margin of the outer lip, which is minutely crenulate within; inner lip with three more prominent, anterior plications and five weaker posterior to these, eight in all, becoming obsolete posteriorly; the second anterior plication is very strong, grooved on top, appearing double. The body whorl is delicately and elegantly ornamented with fourteen regular, revolving, chestnut-brown lines, not visible except with a lens. Length 6.5, width 4.25 mm.

This species is about the size and form of *P. catenata* Mont. living at Monte Cristi, but the color markings are different and the margin of the lip in that species is not so thickened nor has the base the strong keel. The markings of our fossils are somewhat like those of *P. multilineata* and *interrupta-lineata*, but both these are much larger. *M. obesa* is still larger and more convex, while *chrysomelina* is spotted, not lined nor keeled.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao. (Abundant),

Genus LYRIA Gray

Lyria pulchella Sowerby

Plate 11, Figures 10, 10a

Voluta pulchella Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 46, pl. 9, fig. 4, 1849.

Voluta soror Sowerby, *Id.* p. 46.

Lyria pulchella Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 219, 1873.

Voluta pulchella Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 528, 1876.

Lyria pulchella Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 84, pl. 4, fig. 3. 1890.

Lyria pulchella Dall, Bull. 90, U. S. Nat. Museum, p. 58, pl. 10, fig. 11. 1915.

After examining the types, Guppy stated that Sowerby's *V. soror* was undoubtedly synonymous with *V. pulchella*.

We have a fine series of this handsome and abundant shell. A single specimen has been found by Dall in the Tampa silex beds.

Localities.—(Exp'd '19) Bluff 1 (Abundant), Bluff 3, Cercado de Mao; Zones A, B, D, E, F, Rio Gurabo at Los Quemados; Rio Amina between Potrero and Hato Viejo.

Genus MITRA Lamarck

Mitra Henekeni Sowerby

Plate 12, Figures 5, 5a

Mitra Heneken Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 46, pl. 9, fig. 5, 1849.
Mitra Henekeni Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 219, 1873.
Mitra Henekeni Guppy (in part), Quart. Jour. Geol. Soc. London, vol. 32, p. 528, 1876.

Sowerby's type was immature and decollate. The adult shell has ten whorls and measures 56×15.5 mm. A characteristic is the slight truncation of the whorls at the suture. The young resemble *M. filosa*.

We have a large series of this fine *Mitra*, which also occurs in the Caroni Series, Trinidad, and at Bowden.

Localities.—(Exp'd '16) Zones A, B, E, F, Rio Gurabo at Los Quemados; Zones H and I, Rio Cana at Caimito; Bluff 1, Cercado de Mao.

Mitra longa Gabb

Plate 11, Figures 11, 11a

Mitra longa Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 219, 1873.
Mitra longa Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., p. 346, pl. 24, fig. 11, 1913.

This shell is easily differentiated from *M. Henekeni* by its slenderer form, greater number of columellar plications, and the more reticulated aspect of the surface between the main revolving ridges. A decollate shell measures 63 × 13 mm. We have metatypes from Gabb for comparison with our own specimens. The species has been also found at Gatun.

Localities. — (Exp'd '16) Bluff 1, Cercado de Mao; Zone I, Rio Cana at Caimito.

Mitra quemadica, n. sp.

Plate 11, Figure 12

Shell fusiform, biconic, suture indistinctly bordered by a sub-nodulose band; entire surface ornamented with revolving cords, five on the penultimate, and fifteen on the ultimate whorl; these cords are equidistant except just below the suture, where the interspace is double the normal; they are crossed by much weaker longitudinal growth-lines; aperture elliptical; columella with three strong posterior folds and one faint anterior one; margin of outer lip serrate. Length 28, width 11 mm.

In some respects this shell agrees with Gabb's description of his unfigured *M. rudis*, but our shell is narrower and has many instead of *a few* revolving spirals.

Locality. — (Exp'd '16) Zone D, Rio Gurabo at Los Quemados (Rare).

Mitra titan Gabb

Plate 11, Figures 14, 14a

Mitra titan Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 220, 1873.
Mitra titan Dall, Trans. Wagner Inst. Sc., vol. 3, pt. 1, p. 94, 1890; pt. 2, p. 229, 1892.

This shell is strikingly like the Jacksonian Eocene *M. Millingtoni*, but the latter is slenderer with a more elongate last whorl. Doubtless the Dominican shell is the descendant of the earlier species which lived in the Mississippi embayment. We have a metatype of *M. titan*. The type measured 152 × 45 mm. Gabb's *M. symmetricus* may be the young of *titan*.

Mitra tortuosa Gabb

Plate 11, Figure 13

Mitra tortuosa Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 220, 1873.

Shell with about twelve whorls, the first two nuclear; later whorls sculptured by a dozen sharp ribs extending from suture to suture, with concave interspaces marked by spiral incised lines. The shell measures 28 × 10 mm. We have several metatypes for comparison.

Locality. — (Exp'd '16) Zone E, Rio Gurabo at Los Quemados.

Mitra Berlineri, n. sp.

Plate 11, Figures 15, 15a

Shell large, solid, typically mitriform, spire elevated; slightly less in length than the aperture; whorls seven and a half, the first two smooth, the third and all the subsequent volutions sculptured by many sub-equal, sub-equidistant, somewhat wavy and irregular alternating furrows and ridges; and by unequal, irregular, broad, more or less obsolete, longitudinal plications which extend from the suture to the base of the whorls; suture distinct with a rather ill-defined sub-sutural band; aperture large, not contracted anteriorly. Columella encrusted with a thick callus, and bearing four strong plications; canal nearly straight. Length of shell 83, width 24 mm.

This large *Mitra* rivals *M. titan* in size, but is unlike any recent or fossil species from the southeastern coast of America or from the Antilles.

I take the greatest pleasure in naming this splendid *Mitra* in honor of Mr. Emile Berliner, of Washington. D. C., as a slight token of appreciation of his generous gift of the Sarah Berliner Foundation, which has made this work possible.

Locality. — (Exp'd '16) Bluff 1, Cercado de Mao,

Mitra (*Strigatella?*) *perturbatrix*, n. sp.

Plate 14, Figures 1, 2

Shell slender, somewhat Columbelliform, spire a trifle shorter than the aperture; suture distinct; whorls eight, the first two smooth, nuclear; post-nuclear whorls slightly convex, ornamented with weak, equidistant longitudinal plications, about twenty on each of the last two whorls; the plications are strongest over the convex portion of the volutions and fade out near the sutures; aperture narrowly elliptical, inner lip with a callus; columella with three sharp anterior and two weaker posterior plications; outer lip thickened with a stout, marginated external band, marked by an internal posterior Strombinoid notch and showing traces of obsolescent crenulations within, not lirate. Length of shell 20, greatest width 8.5 mm.

Locality. — (Exp'd '16) Zone D, Rio Gurabo at Los Quemados.

Genus PLOCHELÆA Gabb

Plochelæa crassilabra Gabb

Plate 14, Figure 3

Plochelæa crassilabra Gabb, Proc. Acad. Nat. Sci. Phila., vol. 24, p. 271, pl. 11, fig. 5, 1872.

Plochelæa crassilabrum Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 216, 1873.

Shell Oliva-form, tapering anteriorly, spire low, suture obsolete, whorls about eight; aperture narrow; inner lip crossed by about six slightly oblique, weak, linear plications; outer lip much thickened at its center; columella recurved, sinus deep, oblique. Length of shell 35, greatest width 17 mm.

The above description is of a metatype from Santo Domingo. This species is the genotype of *Plochelæa*.

Genus TURRICULA Klein

Turricula (*Costellaria*) *Bullennewtoni*, n. sp.

Plate 12, Figures 6, 6a

Shell elongate, turreted, coronated; whorls eight, each ornamented by nine sharp-edged, longitudinal riblets, terminating at the shoulder in spinose tubercles, not extending to the suture, coronating the shoulder; surface covered with close, coarse, even spiral threads; aperture narrow, outer lip sharp, lirate far within; inner lip with a light callus, columella with two distinct, slightly oblique plications. Length of shell 13, greatest width 5.25 mm.

This interesting shell is apparently nearest akin to such forms as *C. cadaverosa* Reeve and *C. exasperata* Gmelin, living in the Polynesian and Red Sea regions. The whole genus now is characteristically Polynesian; but our shells so resemble specimens of *C. cadaverosa* from the Philippines that there can be no doubt of their belonging to the same genus.

An allied genus is *Lapparia* Conrad, represented by *L. dumosa* in the Jacksonian Eocene of Mississippi.

I take great pleasure in naming this species in honor of Dr. R. Bullen Newton of the British Museum.

Localities. — (Exp'd '16) Zones D and E, Rio Gurabo at Los Quemados.

Genus FUSUS Lamarck

Fusus Henekeni Sowerby

Plate 12, Figure 1

Fusus Henekeri Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 49, 1849.

Fusus Henekeni Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 204, 1873.

Fusus Henekeni Guppy, Geol. Mag. London. p. 439, 1874; Quart. Jour. Geol. Soc. London, vol. 32, p. 524, pl. 28, fig. 6 (type), fig. 2 (variety *haitensis*), 1876.

Fusus Henekeri Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1584, 1903.

Fusus Henekeni Grabau, Smithsonian Misc. Coll., vol. 44, no. 1417, p. 19, 1904.

This fine species is characterized by its convex whorls with rounded ribs (nine on the body whorl), and primary, secondary and tertiary spirals. Our largest shell measures 90×24 mm. Guppy has given an excellent figure of Sowerby's type, collected by Heneken. The species also occurs at Bowden.

Professor Grabau has noted the strong resemblance of *F.*

*Heneken*i to *F. eucosmium* Dall, living in the Antilles. Doubtless our fossil is the ancestor of this more slender, recent shell.

Localities. — (Exp'd '16) Bluffs 1 and 3, Cercado de Mao; Zones A and B, Rio Gurabo at Los Quemados; Zone H, Rio Cana at Caimito.

Fusus Henekeni variety *haitensis* Sowerby

Plate 12, Figure 2

Fusus Haitensis Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 49, 1849.

Fusus Haitensis (?) Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 204, 1873.

Fusus haitensis Guppy, Geol. Mag. London, p. 439, 1874.

Fusus Henekeni variety *haitenses* Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 524, pl. 28, fig. 2, 1876.

Fusus haitensis Grabau, Smithsonian Misc. Coll., vol. 44, no. 1417, p. 20, 1904.

Shell resembling *F. Henekeni* and grading into that species, but differing as follows: — (1) The whorls are angulated, carinated, and flattened posteriorly; (2) the ribs do not continue to the suture; (3) the spirals are more distant, not crowded; (4) the ribs often become obsolete on the later whorls. This accelerated gerontism appears to be an individual characteristic.

Localities. — (Exp'd '16) Zones A, B, D, Rio Gurabo at Los Quemados; Bluff 3, Cercado de Mao; Zone I, Rio Cana at Caimito.

Fusus Henekeni variety *Veatchi*, n. var.

Plate 12, Figure 3

Shell resembling *F. Henekeni*, but differing in the following respects: — (1) The structure of the shell is much lighter so that a specimen of equal size is much less ponderous and thinner; (2) the spirals are less crowded and less sharply ridged; (3) the earlier whorls have about eight rounded, longitudinal ribs to a volution, but they begin to fade out on the third whorl from the last; (4) the last two whorls are without ribs, are ventricose, not

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carinated, slightly channeled beneath the suture; (5) inner lip with a mere wash of callus, not rugose except posteriorly where the spirals of the body whorl show through the light callus. Length 88, width 24 mm.

In general aspect *F. Henekeni Veatchi* recalls *F. longicaudatus* Bory, now living off Ceylon.

In *F. Henekeni* the ribs persist, in *Henekeni haitensis* they tend to become obsolete, in *F. Henekeni Veatchi* this gerontic character is greatly intensified.

This fine Fusus is named in honor of Mr. Arthur C. Veatch of London, England, as a token of friendship, and appreciation of his great assistance in this work.

Locality.— (Exp'd '16) Zone H, Rio Cana at Caimito.

Genus FASCIOLARIA Lamarck

Fasciolaria semistriata Sowerby

Plate 13, Figure 1

Fasciolaria semistriata Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 49, 1849.

Fasciolaria intermedia Sowerby, *Id.* vol. 6, p. 49. 1849.

Fasciolaria semistriata Guppy, Quart. Jour. Geol. Soc., vol. 22, p. 288, pl. 16, fig. 12, 1866.

Fasciolaria semistriata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 216, 1873.

Fasciolaria semistriata Guppy, Geol. Mag. London, p. 438, 1874.

Fasciolaria intermedia Guppy, Quart Jour Geol. Soc., vol. 32, p. 523, 1876.

Fasciolaria semistriata Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 1. pp. 101, 102, 1890; pt. 6, p. 1583, 1903.

Sowerby compared this species to the recent Australian *F. fusiformis* Valenciennes, which it resembles in general form; but its real affinities are with the West Indian *F. tulipa* Linné.

There seems no doubt that Guppy was correct in regarding Sowerby's *F. intermedia* as synonymous with *F. semistriata*. Sowerby described *F. intermedia* as six-whorled, the first smooth, papilliform, the second, third and fourth tuberculate, *the rest ventricose, smooth.* This would apply to specimens of *semistriata* but not to the *intermedia* of Gabb and others.

F. semistriata has also been reported from Bowden and Auguilla.

Localities. — (Exp'd '16) Bluff 1, Cercado de Mao (Abundant); Zone G, Rio Gurabo at Los Quemados.

Fasciolaria Kempi Maury

Plate 12, Figure 4

Fasciolaria intermedia Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 217, 1873. Not *Fasciolaria intermedia* Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 49, 1849 (= *F. semistriata* Sowerby.)

Siphonalia Kempi Maury, Bull 21. Amer. Paleont., vol. 4, p. 138, pl. 5, fig. 5, 1910.

Fasciolaria intermedia Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., p. 506, 1912. Not of Sowerby.

This species was incorrectly identified by Gabb as Sowerby's *intermedia.* The true *F. intermedia* has the whorls (after the fourth) *smooth*, while those of Gabb's shell, as shown by our figure, are *tuberculate.*

By accident a fragmentary shell was mixed with Chipola material and erroneously described by the writer as a *Siphonalia.*

Fasciolaria Kempi is a small member of the *F. gigantea* stock· Its Gatun analogue is *F. Gorgasiana* Brown and Pilsbry. Our specimens were collected by Gabb in Santo Domingo, and the species is also found at Bowden.

Fasciolaria carminamaris, n. sp.

Plate 13, Figure 2

Shell large, very handsome, whorls convex, not carinate, concavely flattened posteriorly; ornamented with thirteen rounded tubercles on the shoulder, cut by an ill-defined revolving sulcus so as to appear double. The center of the sulcus is occupied by a granular thread; in addition there is a second, anterior row of smaller rounded nodules lying close to the suture of the following volution, and on the body whorl along the continuation of the sutural line; the penultimate whorl bears nineteen and the last whorl twenty of these nodules; an ill-defined third row of still smaller nodules borders the convex portion of the body whorl. The entire shell is sculptured with numerous rather irregular, interrupted, very granulose threads and ridges, more or less alternating with weaker spirals; aperture medium; outer lip strongly lirate within, the liræ being linear not granulose; inner lip with a callus thickest anteriorly; columella with one very strong anterior plication, a weaker median, and a suggestion of a third faint, posterior plication; canal rather long, nearly straight. Length 93, width 40 mm.

Locality. — (Exp'd '16)—Bluff 1, Cercado de Mao. (A single shell.)

Genus LATIRUS Montfort

Latirus infundibulum Gmelin

Plate 13, Figure 3

Latirus infundibulum Gmelin, Lamarck, Anim. sans Vert. (ed. Desh.) vol. 9, p. 386: Reeve Conch. Icon., Turbinella, No. 3.

Latirus infundibulum Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 288, 1866; Geol. Mag. London, p. 438, 1874.

Latirus infundibulum Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 217, 1873.

Turbinellus (*Latirus*) *infundibulum* Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 523, 1876.

Latirus infundibulum Dall. Bull. 37, U. S. Nat. Mus., p. 112, 1889; Trans. Wagner Inst. Sci. vol. 3, pt. 6, p. 1584, 1903.

A recent shell has but ten primary spirals on the convex part of the body whorl while the fossil has sixteen; the ribs are equal in number. The fossil measures 55 × 18. The recent 57 × 19 mm.

A larger series might show that the ancestral form should have a distinctive name, varietal or specific. If so, *gurabensis* would be appropriate.

This species occurs at Bowden, and in the Caroni Series, Trinidad. The recent form is living in rather deep water from the Tortugas to Santa Lucia.

Localities.—(Exp'd '16)—Zones A, B, E, Rio Gurabo at Los Quemados.

Latirus fusiformis Gabb

Plate 13, Figure 4

Latirus fusiformis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 217, 1873.

We have a number of specimens of a *Latirus* agreeing with Gabb's description of this unfigured species.

Localities.—(Exp'd '16) Zone D, Rio Gurabo at Los Quemados; Bluff 2, Cercado de Mao.

Latirus exilis Gabb

Plate 14, Figure 4

Latirus exilis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 217, 1873.

Our shell corresponds exactly with Gabb's description of this striking species, marked by the small aperture and canal twisting to the right upon the pillar.

Locality.—(Exp'd '16.) Zone B, Rio Gurabo at Los Quemados.

Genus XANCUS Bolten

Xancus validus Sowerby

Plate 13, Figure 5

Turbinellus validus Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 50, 1849.

Turbinella valida Gabb, Trans. Amer. Phil. Soc. 15, p. 218, 1873.

Turbinellus validus Guppy, Geol. Mag. London, p. 438, 1874; Quart. Jour. Geol. Soc. London, vol. 32, p. 523, 1876.

Turbinella scolymus Tryon (in part) Manual Conch, vol. 4. p. 70, 1882. Not the recent shell.

Turbinella validus Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 99, 1890.

Turbinella scolymus Dall (in part) Trans. Wagner, Inst. Sci., vol. 3, pt. 1, p. 97, 1890.

The smoother species *X. Wilsoni*, from the Vicksburg is the ancestor of *X. validus*, while the recent *X. scolymus* is its descendant. We have fine shells of *validus* that Gabb collected in Santo Domingo. Guppy reported it from the Caroni Series, Trinidad.

Xancus proævoideus, n. sp.

Plate 14, Figure 18

Turbinella ovoidea Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 218

1873. Not *T. ovoidea* Kiener, Reeve Icon., fig. 23.

Turbinellus ovoideus Guppy, Geol. Mag., p. 438, 1874 (in part;) Quart. Jour. Geol. Soc. London, vol. 32, p. 523, 1876.

Turbinella ovoidea Tryon (in part,) Man. Conch. vol. 4, p. 70, 1882. Not the recent shell.

Our recent shells of *X. ovoidea* collected by the Hartt expedition at Bahia, Brazil, show the spire is spirally striate, *not costate*. In the fossils the spire is *strongly tuberculately costate* for about five whorls, and the three columellar plications are decidedly heavier. Length 178, width 71 mm.

We collected a number of specimens and have also some very fine ones sent by Gabb.

Localities.—(Exp'd '16)—Bluffs 1 and 3, Cercado de Mao.

Genus VASUM Bolten

Vasum haitense Sowerby

Plate 13, Figure 6

Turbinellus Haitensis Sowerby, Quart. Jour. Geol. Soc. London. vol. 6, p. 50, 1849.

Vasum Haitensis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 218, 1873.

Turbinellus Haitensis Guppy, Geol. Mag. London, p. 438, 1874.

Turbinellus Haitensis Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 523, pl. 29. fig. 3, 1876.

Vasum haitense Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 100, 1890.

Specimens of *Vasum engonatum* Dall from the Chipola River, Florida are very close to Guppy's figure of Sowerby's type of *V. haitense* and to our Santo Domingo specimens. The most striking differences are (1) the very squamose surface and (2) the greater flatness of the later whorls in *V. haitense.*

Localities. — (Exp'd '16) Zones A, B, E, Rio Gurabo at Los Quemados.

Vasum dominicense Gabb, variety *gurabicum*, n. var.

Plate 13, Figure 7

Vasum Dominicensis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 218, 1873.

We have a number of specimens resembling *V. dominicense* Gabb but with only three instead of four plications on the columella. Dr. Dall kindly examined one and notes that it is not represented in the National Museum, but is like Gabb's species except for the number of folds. Length of decollate shell 38, greatest width 24 mm.

Locality.—Zone D, Rio Gurabo at Los Quemados.

Genus MELONGENA Schumacher

Melongena consors Sowerby

Plate 14, Figure 5

Pyrula consors Sowerby, Quart. Jour. Geol. Soc., London, vol. 6, p. 49, 1849.

Melongena melongena Gabb (in part,) Trans. Amer. Phil. Soc., vol. 15, p. 205, 1873. Not *M. melongena* Linné, nor *M. patula* Brod. and Sby.

Pyrula melongena Guppy (in part) Geological Mag. London, p. 438, 1874.

Pyrula melongena Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 523, 1876.

Melongena consors Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 121, 1890; pt. 6, p. 1584, 1903.

This is the higher spired, ancestral form of *M. melongena* which abounds on the Monte Cristi beach. The fossil shell is also abundant. Our largest specimen measures 125×85 mm. It occurs also at Cumana, and Bowden.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao; Zone I, Rio Cana at Caimito.

Genus METULA H. and A. Adams

Metula cancellata Gabb

Plate 14, Figure 19

Metula cancellata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 205, 1873.

Metula cancellata Dall, Trans. Wagner Inst., vol. 3, pt. 6, p. 1584, 1903.

Closest akin to this shell is the Isthmian species *M. Gabbi* Brown and Pilsbry from the Gatun beds (Proc. Acad. Nat, Sci. Phila., p. 351, pl. 25, figs. 4, 8, 1911.)

Dr. Dall reports *Metula cancellata* from the Bowden beds, Jamaica.

Locality. — (Exp'd '16)—Bluff 1, Cercado de Mao. (A single specimen only of this exquisite shell.)

Genus PHOS Montfort

Phos Gabbii Dall

Plate 14, Figure 6

Phos Veraguensis Gabb (in part,) Trans, Amer. Phil. Soc., vol, 15, p. 212, 1873. Not *P. veraguensis* Hinds.

Phos Gabbii Dall, Proc. U. S. Nat. Museum, vol. 19, No. 1110, pp. 310, 311, pl. 29, fig. 4, 1896.

Shell with twenty ribs on the last whorl crossed by spiral bands. Length 22, width 11 mm.

Dr. Dall has kindly compared our shells with his type which Bland collected at Potrero, Rio Amina. The shell also is found at Bowden.

Localities. — (Exp'd '16) Bluffs 2 and 3, Cercado de Mao.

Phos Moorei Guppy

Plate 14, Figures 7, 8

Phos Veraguensis Moore, Qnart. Jour. Geol. Soc. London, vol. 6, p. 40 and 43, 1849.

Phos Moorei Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 290, pl. 16. fig. 11, 1866.

Phos Veraguensis Gabb (in part) Trans. Amer. Phil. Soc., vol, 15, p. 212, 1873. Not *P. veraguensis* Hinds nor *elegans* Guppy.

Phos erectus Guppy, Geol. Mag., vol. 11, p. 410, pl. 16 fig. 1, 1874.

Phos Moorei Dall, Proc. U. S. Nat. Museum, vol. 19, No. 1110, pp. 310, 311, 1896.

This species is closely related to the recent West coast *Phos veraguensis* as a comparison with specimens from Veragua proves. *P. gatunensis* Toula appears to be the Isthmian analogue.

We are indebted to Dr. Dall for comparing our shells with Guppy's Bowden type of *P. Moorei.*

Localities.—(Exp'd '16) Zones E and F, (Common) Rio Gurabo at Los Quemados. A shell from Bluff 1, Cercado de Mao was identified by Dr. Dall as a mutation of this species.

Phos elegans Guppy

Plate 14, Figure 10

Phos elegans Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 290, pl. 16, fig. 13, 1866.

Phos Veraguensis Gabb (in part) Trans. Amer. Phil. Soc., vol. 15, p

212. Not *P. veraguensis* Hinds.
Phos elegans Guppy, Quart. Jour. Geol. Soc. London, vol. 32. p. 524 1876. Exclude synonymy.

Dr. Dall most kindly compared our Dominican shells with Guppy's Bowden type, and pronounced them identical. Ours appear slightly more shouldered, with a less convex body whorl, and usually show a number of varix-like thickenings which Guppy does not mention in his description. The shell was also found by Guppy at Cumana.

Localities. — (Exp'd '16) Zones D and E, Rio Gurabo at Los Quemados (Common); Trail Hato Viejo to Potrero, Rio Amina.

Phos Guppyi Gabb

Plate 14, Figure 9

Phos Guppyi Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 212, 1873.
Phos Guppyi Guppy, Quart. Jour. Geol. Soc., London, vol. 32, p. 524, 1876.
Strongylocera Guppyi Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1584, 1903.

This shell is particularly interesting because of the changes in sculpture it assumes at different stages of its early life. The recent *P. Beauii* Fischer, from Guadaloupe has some resemblance to our fossils, but the spiral sculpture is much weaker.

P. Guppyi is also found at Bowden.

Locality. — (Exp'd '16) Zone D, Rio Gurabo at Los Quemados (Rare).

Phos semicostatus Gabb

Plate 14, Figures 11, 12

Phos semicostatus Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 212, 1873.

P. semicostatus has never heretofore been figured, but we have a number of metatypes sent by Gabb which he collected in Santo Domingo in the early Seventies.

The Isthmian analogue is the much larger shell, *P. subsemicostatus* Brown and Pilsbry.

Phos costatus Gabb

Plate 14, Figures 13, 14

Phos costatus Gabb, Trans. Amer. Phil. Soc., vol. 15, pp. 212, 213, 1873.

We have a number of Gabb's metatypes which have been very helpful for comparison in identifying this unfigured species. It belongs to the section *Strongylocera* Mörch.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao.

Phos fasciolatus Dall

Plate 14, Figures 15, 16

Phos (*Strongylocera*) *fasciolatus* Dall, Proc. U. S. Nat. Museum, vol. 19, No. 1110, p. 311, pl. 28, fig. 12, 1896.

This species is extremely close to *Phos costatus*. The latter is somewhat more robust; with fewer longitudinal ribs (9 against 11—14); with the spirals tending to become obsolete in the interspaces; and with a smaller protoconch, the spirals not appearing until after the fourth riblet.

The type of *P. fasciolatus* was collected by Bland at Potrero Rio Amina.

Localities. — (Exp'd '16) Zones H. and I, Rio Cana at Caimito (Abundant); Bluff 3, Cercado de Mao.

Phos metuloides Dall

Plate 14, Figure 17

Phos metuloides Dall, Proc. U. S. Nat. Mus., vol. 19, No. 1110, p. 310, pl. 28, fig. 15, 1896.

The type was collected by Bland at Ponton, Santo Domingo. The shell has also been found at Monkey Hill, Isthmus of Panama.

Genus NASSARINA Dall

Nassarina Olssoni, n. sp.

Plate 21, Figure 2

Shell small, spindle-shaped, protoconch of only about one whorl, smooth; post-embryonic whorls five, channeled anteriorly, the suture lying in the deep channel; sculpture of slightly oblique, strong, longitudinal ribs and fainter spirals; a faint spiral lies just anterior to the suture, then a band, and two spirals follow on the whorls of the spire, but additional spirals appear on the last whorl making about twelve in all; the ribs extend from suture to suture but are deeply cut by the channel, they number about eleven on the last whorl; aperture rather narrow; outer lip somewhat thickened, with four internal denticles, the posterior being the strongest; inner lip with a callus and denticulate. Length 4.5, width 1.60 mm.

This species has the form of the recent *N. glypta* but differs strikingly in the deeply excavated suture, single embryonic volution, and adult sculpture.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Genus METULELLA Gabb

Metulella venusta Sowerby

Plate 15, Figures 26, 27

Columbella venusta Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, pp, 46, 47, pl. 9, fig. 6, 1849.
Metulella venusta Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 206, 1873.
Columbella venusta Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 526, 1876.

We have a number of Gabb's specimens to compare with ours. *M. venusta* has not been found outside of Santo Domingo.

Localities.—(Exp'd '16) Bluff 1, Cercado de Mao; Zone G, Rio Gurabo at Los Quemados.

Metulella fusiformis Gabb

Plate 15, Figure 28

Metulella fusiformis Gabb, Proc. Acad. Nat. Sci. Phila., p. 270, pl. 11, fig. 3, 1872.
Metulella fusiformis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 206, 1873.

We have a metatype from Santo Domingo sent by Gabb of this rare shell. It is the genotype of *Metulella.* Gabb thought the affinities of the genus were with the Fusinae, Fischer with Mangilia, and Dall with Nassarina.

Metulella Williamgabbi, n. sp.

Plate 15, Figure 29

Shell slenderly fusiform, whorls nine, the first two smooth, nuclear, subsequent volutions ornamented by uniform, narrow, longitudinal riblets of which there are twenty-five on the last whorl; spiral striae faint, obsolescent; whorls flattened on the sides; narrowly channelled above the suture; aperture elliptical; inner lip with a callus bearing six transverse denticles; outer lip with six distinct lirae and a seventh weaker one within the aperture. Length of shell 17, of aperture 7, of spire 10; greatest width 6 mm.

This species is very closely related to *M. fusiformis*, but can be easily differentiated by its laterally flattened whorls, higher spire, and obsolescent spirals. The surface is not regularly cancellate, nor are the whorls evenly and convexly rounded as in *M. fusiformis*.

This interesting shell is named in honor of Professor Gabb by whom it was collected in Santo Domingo over forty years ago. It is the third species of his Dominican genus *Metulella*.

Genus ALECTRION Montfort

Alectrion cercadensis, n. sp.

Plate 15, Figures 19, 20

Shell small, acute, with two and a half nuclear, and four and a half post-nuclear whorls; longitudinal sculpture of small, rounded, oblique ribs, twelve on the last whorl; the ribs often become obsolete on the body whorl, spiral sculpture of raised threads, nodular on crossing the ribs, four to six on each volution of the spire; on the body below the four spirals is an anterior set of ten finer spirals; where the ribs become fainter, equalling the spirals, a subcancellate ornamentation results, very characteristic of this species; anterior sulcus deep; beak sculptured by six spirals; outer lip with a stout external varix, denticulate within and with long liræ. Length 7.5, greatest width 5.25 mm. A cancellate specimen with obsolete ribs on the last whorl measures 7.5×5 mm.

Gabb does not mention any Dominican Nassas. Guppy identified those in Heneken's collection with the European *N. incrassata.*

Locality. — (Exp'd '16) Bluffs 2 and 3, Cercado de Mao.

Alectrion gurabensis, n. sp.

Plate 15, Figure 21

Nassa incrassata Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 524, 1876. Not *N. incrassata* Müller,

Shell larger and stouter than the other two species, with three smooth nuclear and six sculptured post-nuclear whorls, convex, *angulated and shouldered:* suture wavy; longitudinal sculpture of narrow, rounded ribs, eleven on the body whorl, alternating with wider interspaces; spiral sculpture of three stronger, more widely spaced threads revolving about the middle of each whorl of the spire with, on the penultimate volution, three additional weaker threads on either side; on the last whorl there are three or four threads posterior to the three primaries and twelve anterior; anterior sulcus well defined; beak with eight spirals; aperture round; outer lip with eight liræ within; inner lip with a posterior denticle; collumella rugose. Length 11, 6 mm.

This species resembles the recent *A. incrassata* Müller, ranging from Iceland to the Mediterranean, but that has convex, not angulated whorls, sixteen ribs, a larger callus, and thicker outer lip. Our fossil also recalls *A. consensa* Ravenel and possibly is the same as the Bowden shell listed by Dall as *Nassa* near *consensa.*

Locality. — (Exp'd '16) Zone D, Rio Gurabo at Los Quemados.

Alectrion losquemadica, n. sp.

Plate 15, Figures 22, 23

Nassa ambigua Dall (in part), Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1584, 1903. Not *N. ambigua* Montagu.

Shell closely resembling the recent *A. ambigua*, which abounds on the beach at Monte Cristi; but differing in the following respects: — (1) The perfect fossil shells have an elevated, conical protoconch of three to three and one-half smooth whorls, the apical very small, the others gradually increasing; while the recent shells all have a broad protoconch formed of one and one-half to two smooth, flattened, and noticeably swollen whorls; (2) the fossil shells have fourteen ribs on the last whorl, the recent only twelve; (3) the fossil shells are smaller, our largest recent shell measures 12 × 7, but the largest fossil is only 8 × 5 mm.

I would think the fossil shell a dwarfed form of the recent were it not for the striking difference in the protoconchs, suggesting that they were derived from diverse ancestral stocks.

Dr. Dall listed *A. ambigua* from Bowden, Jamaica, and from Santo Domingo. Probably the Dominican, and perhaps the Bowden forms are the same as ours.

The Gatun species *A. præambigua* Brown and Pilsbry differs from our shell widely in its spiral sculpture, the spirals being spaced instead of closely crowded as in the Dominican shell, which has twenty as against eight on the last whorl above the sulcus, and seven against three on the penultimate whorl. The Gatun species also has fewer nuclear volutions.

Locality. — (Exp'd '16) Zone D, Rio Gurabo at Los Quemados.

Genus TRITIA Risso

Tritia golfoyaquensis, n. sp.

Plate 15, Figures 24, 25

Shell with an elevated acute spire, suture distinct; whorls seven, convex, surface ornamented with very regular, flat spiral ridges (eight on the penultimate whorl) sub-cancellated by much feebler longitudinal growth-lines; aperture wide, oval; anterior sinus deep; outer lip sharply striate internally; inner lip with a posterior callus; canal twisted. Length 17, width 9 mm.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao.

Genus ECTRACHELIZA Gabb

Ectracheliza truncata Gabb

Plate 15, Figures 1, 2

Ectracheliza truncata Gabb, Proc. Acad. Nat. Sci. Phila., vol. 24, p. 271, pl. 9, fig. 2, 1872; Trans. Amer. Phil. Soc., vol. 15, p. 214, 1873.

Clea truncata Guppy, Quart. Jour. Geol. Soc. Loc. London, vol. 32, p. 524, pl. 29, fig. 6, 1876.

Ectracheliza trnncata Fischer, Man. de Conchyliologie, p. 637, 1887.

We have several metatypes collected by Gabb in Santo Domingo. The apex is always eroded. Guppy erroneously referred this species to the fluviatile, Malayan genus *Clea* H. and A. Adams. *E. truncata* is the genotype and sole species of Gabb's *Ectracheliza*.

Genus COLUMBELLA Lamarck

Subgenus *Meta* Reeve

Meta islahispaniolæ, n. sp.

Plate 15, Figure 3

Shell small, coniform, spire very acute, suture distinct, whorls eight, the first two smooth, nuclear, horn-colored or glassy; first three post-nuclear whorls ornamented with longitudinal riblets, eight or ten to each volution, giving them a coronate aspect; these riblets then entirely fade out, so that the last three whorls of the spire are smooth except for arcuate growth-lines, and are channeled; body-whorl with a shoulder carina and marked anteriorly by a varying number of incised lines, there being on one shell only six near the base, but on the other about twenty, extending almost to the center of the whorl; aperture very narrow; inner lip with a thickening at the center; outer lip thickened externally, the thickening slightly plicated at the base, margin of lip thin, bearing within about fifteen short liræ; anterior sinus rounded, posterior U-shaped, situated above the shoulder carina. Length 11, width 6 mm.

This rare shell appears to be referable to the genus *Meta*.

Locality. — (Exp'd '16)—Bluff 3, Cercado de Mao.

Meta perplexabilis, n. sp.

Plate 15, Figures 4, 5

Shell with a slight general resemblance to *M. epamella* Duclos; entirely smooth except for faint growth striæ and a varying number of incised lines and corresponding ridges on the anterior part of the body whorl; nuclear whorls two, swollen, glassy; post-nuclear whorls five, slightly truncated at their posterior margin, and so coiled as to project a trifle above the suture, rendering it sub-canaliculate; over the last half of the body whorl the suture droops then suddenly rises abruptly near the aperture; inner lip of adult shells with a thin callus through which the spiral threads of the body appear as rugosities; outer lip with a slight external thickening, a thin margin and with about sixteen liræ within; but immature shells have a smooth outer lip. Length of shell 13, greatest width 6 mm.

This perplexing shell seems nearest to the genus *Meta*. It resembles a young *Strombus* in general form.

Locality. — (Exp'd '16)—Bluff 3, Cercado de Mao.

Subgenus *Strombina* Moerch

Strombina haitensis Sowerby

Plate 15, Figure 18

Columbella haitensis Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 46, 1849.

Not *Strombina Haitensis* Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 221, 1873.

Columbella haitensis Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 526, 1876.

Anachis haitensis Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1584, 1903.

We are greatly indebted to Dr. R. Bullen Newton of the British Museum for his kindness in sending us photographs of this perplexing, unfigured species. Dr. Newton writes, "I have critically examined Sowerby's *Columbella haitensis* consisting of

6 specimens and they all appeal to me as representing the genus *Strombina.* To make this decision, however, more emphatic I have had the group of shells photographed both natural size and an enlargement of 4 diameters. * * *. These I think will fully convince you that Gabb was correct in referring the species to *Strombina.*"

But the *Strombina* referred by Gabb to *haitensis* is ribbed only on the spire, *never on the body* (except when young) and the shell is more ventricose and larger than the true *haitensis.* I have called it *pseudohaitensis.*

Our shell nearest *haitensis* is *Strombina Bassi.* This is of the same ribbed type, but very much larger, measuring 11.50× 5, against 7×3.50 mm.

Anachis exilis Gabb, with which *S. haitensis* has been confused, is a true *Anachis* and entirely distinct.

Strombina pseudohaitensis, n. sp.

Plate 15, Figures 12, 13

Strombina Haitensis Gabb, Trans. Amer. Phil. Soc., vol. 15, p 221, Not *Columbella Haitensis* Sowerby, 1849.

Planaxsis crassilabrum Guppy, Geol. Mag. London, p. 411, pl. 18, fig. 13, 1874. (Young specimen).

This differs from the true *S. haitensis* in the absence of ribbing from the body whorl of adult shells. The ribs become obsolete on the sixth or seventh and are never present on the eighth whorl. A large shell measures 9×5 mm. We have specimens from Gabb and many hundreds of our own of all ages.

Localities.—(Exp'd '16)—Bluffs 3, Cercado de Mao. (Extremely abundant).

Strombina pseudohaitensis variety *gurabensis,* n. var.

Plate 15, Figure 14

Shell oblong-ovate, slender, high-spired, whorls eight, the first three smooth, nuclear; riblets on the fourth oblique, on the fifth vertical, on the sixth obsolete, the seventh and eighth are smooth except for spiral impressed lines at the anterior third of the eighth; outer lip internally notched, with a thickened ridge, but not yet denticulate. Length 8, width 4 mm.

This shell differs in its slenderer form from *S. pseudohaitensis.*

Locality.—Zone G, Rio Gurabo at Los Quemados. (Rare).

Strombina Bassi, n. sp.

Plate 15, Figure 17

Shell with eight whorls, the first two nuclear, smooth, subsequent whorls ornamented with close-set riblets, twenty-one on the penultimate whorl, but only ten on the last whorl, since they become obsolete on the latter half of that volution; spiral sculpture of impressed revolving lines on the anterior half of the last whorl; a stout varix lies just behind the outer lip and beside it are two longitudinal wrinkles representing the obsolete riblets; outer lip with a couple of denticles posterior to the notch and about nine anterior; inner lip encrusted with callus; columella rugose, with seven irregular, transverse plications; canal very short, reflexed. Length 9, width 5 mm.

S. caribæa has *no* riblets, *S. pseudohaitensis* has riblets *only on the spire*, *S. Bassi* has riblets *continuing until the last half of the last whorl.*

This species is named in honor of Mr. Albert M. Bass, Consuelo Estate, Macoris, Santo Domingo.

Localities.—(Exp'd '16) Zones D and E, Rio Gurabo at Los Quemados.

Strombina Nanniebellæ, n. sp.

Plate 15, Figures 15, 16

Shell ovate, spire acute, last volution inflated, suture distinct, whorls nine, the first three smooth, nuclear, the fourth and fifth with fine, microscopic, close, longitudinal riblets, the sixth, seventh and eighth entirely smooth, the ninth has about a dozen spiral grooves anteriorly and one sub-sutural groove and corresponding ridge; outer lip with a varix-like thickening, entirely smooth within; inner lip with a posterior dentate callosity, and a thin plate of callus on the columella through which the spiral striations are seen; aperture wide, elliptical. Length 13, width 7 mm.

This species is named in honor of Miss Nannie Belle Maury of Washington, D. C.

Localities.—(Exp'd '16) Sandy clays, Zones H and I, Rio Cano at Caimito. (Abundant and characteristic.)

Strombina cyphonotus Pilsbry and Johnson

Plate 15, Figures 7, 8

Strombina gradata Gabb (in part), Trans. Amer. Phil. Soc,. vol. 15, p. 221, 1873. Not *Columbella gradata* Guppy, Quart. Jour. Geol. Soc. London, vol 22, p. 288, pl. 16, fig. 10, 1866.

Strombina Gabbiana Newcomb, Manuscript. Specimens Cornell University Museum, No. 19750 Newcomb Collection.

Strombina cyphonotus Pilsbry and Johnson, Proc. Acad. Nat. Sci. Phila., p. 353, pl. 25, figs. 6, 7, 1911.

Nearly half a century ago Dr. Newcomb noted that this species was not identical with Guppy's Jamaican *S. gradata*, and gave the manuscript name *S. Gabbiana* (Newcomb Collection No. 19750). In late years Johnson and Pilsbry named the Dominican shell *S. cyphonotus*.

Strombina prisma Pilsbry and Johnson

Plate 15, Figures 9, 10

Strombina gradata Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 221, 1843. Not *Columbella gradata* Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 288, pl. 16, fig. 10, 1866.

Strombina prisma Pilsbry and Johnson. Proc. Acad. Nat. Sci. Phila., pp. 352, 353, pl. 15, figs. 9, 10, 1911.

The closest allies of *S. prisma* are *S. cyphonotus* and the Gatun analogue, *S. Lessepsiana* Brown and Pilsbry. *S. cancellata* Sowerby, living at Panama, has the same triangular last whorl, and an extremely prominent dorsal hump, but the whorls are carinated and coronated.

Strombina caribæa Gabb

Plate 15, Figure 6

Strombina caribæa Gabb, Trans. Amer. Phil. Soc. vol. 15, p. 221, 1873.
Astyris caribæa Dall, Trans. Wagner, Inst. Sci., vol. 3, pt. 6, p. 1584, 1903.

We have a metatype of this unfigured, greatly thickened species, distinguished from the other Dominican *Strombinas* of similar size by the single hump, the Ranella—like flattening, and the *entire absence* of longitudinal ribs. The shell occurs also at Bowden.

Strombina Neustrasenoræ, n. sp.

Plate 15, Figure 11

Shell with seven whorls, the first two smooth, nuclear, the third with minute oblique riblets, the fourth and fifth with vertical riblets, sixth and seventh volutions smooth; on the last whorl behind the varix of the lip is an oblique hump and on the left side of the body, opposite to the outer lip, are two longitudinal wrinkles; at the base of the shell are a number of impressed spiral lines; outer lip with a conspicuous, thickened margin ascending to the suture, and with six internal denticles; inner lip encrusted with callus; collumella rugose with six short, transverse plications; canal short, sharply reflexed. Length 8, width 4.50 mm.

This pretty species is characterized by its curious thickened, ascending outer lip.

Locality.—(Exp'd '16) Zone G, Rio Gurabo at Los Quemados. (Rare).

Strombina divilitus Harris and Maury, n. sp.

Plate 21, Figure 12

Strombina exilis Gabb, Jour. Acad. Nat. Sci. Phila., vol. 8, new ser. p. 356, pl. 46, fig. 41, 1874—1881. Not *Strombina exilis* Gabb, Trans. Amer. Phil. Soc. vol. 15, p. 222, 1873.

As noted under *Anachis exilis* Gabb, two very different shells were named by Gabb *Strombina exilis.* The Santo Domingo shell retains this name and the Pliocene species from Costa Rico we have renamed *divilitus.*

Subgenus NITIDELLA Swainson

Nitidella cibaoica, n. sp.

Plate 21, Figures 3, 4

Shell polished and shining, somewhat Strombiform, smooth except for growth lines and for faint, obsolete longitudinal riblets on the first two post-nuclear whorls; spire elevated, acute, suture distinct, linear; nuclear whorls two, post nuclear six, gently convex; apeture acute posteriorly, widening and truncate anteriorly; inner lip with two small plications; outer lip much thickened, its margin slightly inflected, bearing within about ten denticles. Length 15, width 8 mm.

This apecies appears somewhat intermediate between *N. nitida* Lamarck and *N. laevigata* Linné, both now living in the West Indies.

Apparently this is the first *Nitidella* to be found in the blue clays of Santo Domingo.

Localities.—(Exp'd '16) Sandy clays of Rio Cana at Caimito; Zone D, Rio Gurabo at Los Quemados.

Subgenus ANACHIS H. and A. Adams

Anachis exilis Gabb

Plate 21, Figure 5

Strombina exilis Gabb, Trans. Amer. Phil. Soc., vol. 15. p. 222, 1873.

Not *Strombina exilis* Gabb. Jour. Acad. Nat. Sci. Phila., New Ser., vol. 8, p. 356, pl. 46, fig. 41, 1874—1881. (*S. divilitus* Harris and Maury.)

Columbella exilis Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 526, 1876.

Anachis exilis Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 135, 1890.

Anachis haitensis Dall, *Id*, pt. 6, p. 1584, 1903. Not *haitensis* Sowerby.

We have metatypes from Gabb and at least a thousand specmens of our own of this pretty shell. It has been confused with *Strombina haitensis*, but is perfectly valid and distinct. It does not attain a length exceeding 5 mm.

This *Anachis* also occurs at Bowden.

Locality.—(Exp'd '16).—Bluff 3, Cercado de Mao. (Extremely abundant.)

Subgenus ASTYRIS H. and A. Adams

Astyris Debooyi, n. sp.

Plate 21, Figure 6

Shell with six whorls, the first two glassy, nuclear; the four following porcellanous, entirely smooth except for six revolving, impressed lines at the anterior part of the last whorl; collumella with a thin callus through which the six striæ encircling the base of the shell are visible; outer lip with six minute, microscopic denticles, of which the two posterior are much the stronger. Length of shell 5, of aperture 2, greatest width 2 mm.

This species has an extra whorl and slenderer form than Say's *A. lunata*. It is very close to *acanthodes* Dall, from the Tampa silex beds, Florida.

This is the first true *Astyris* reported from the Santo Domingo Tertiaries. It is dedicated to Mr. Theodoor de Booy, of New York City, who is carrying on extensive researches in the archæology of Santo Domingo.

Locality.—(Exp'd '16)—Bluff 3, Cercado de Mao. (Rather rare.)

Genus STROMBINELLA Dall

Strombinella acuformis Dall

Plate 21, Figure 7

Strombinella acuformis Dall, Proc. U. S. National Museum, vol. 19, no. 1110, p. 312, pl. 29, fig. 6, 1896.

There are but three specimens known of this rare and graceful shell. We possess one that Gabb collected, and the other two are in the National Museum. The type locality is Potrero, Rio Amina.

Genus TYPHIS Montfort

Typhis alatus Sowerby

Typhis alatus Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 48, pl. 10, fig. 4, 1849.

Typhis alatus Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 203, 1873.

Typhis alatus Guppy, *Idem*, vol. 32, p. 522, 1876.

This rare shell is characterized by the very thin, greatly expanded, wing-like varix.

The type was collected by Heneken in Santo Domingo and Guppy identified the shell from Bowden.

Typhis cercadicus, n. sp.

Plate 16, Figure 12

Shell small, each whorl with four varices and four tubes, the tubes arising slightly behind the varices; on the last whorl are faint indications of about six raised spiral lines; the whorls are shouldered and the varices end at the shoulder; canal wide, covered, former position of canal indicated by a tubular process beside the canal. Length of shell 7, width 4.25 mm.

Locality.—Bluff 1, Cercado de Mao. (Very rare)

Genus MUREX Linné

Murex messorius Sowerby

Plate 16, Figures 1, 2

M. messorius Sowerby, P. Z. S., p. 137, 1840.

M. messorius Reeve, Conch, Icon. *Murex* fig. 90, 1845.

M. recurvirostris Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 201, 1873. Not *M. recurvirostris* Broderip.

M. messorius Dall. Trans. Wagner, Inst. Sci., vol. 3, pt. 1, p. 139, 1890.

M. messorius, Dall and Simpson, U. S. Fish Comm. Bull. for 1900, vol. 1, p. 407, 1901.

M. messorius Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., p.353, 1911.

This ancient static species is still living on the Monte Cristi beach and has undergone no change since the deposition of the blue clays. It is also found at Gatun.

Localities.—(Exp'd '16) — Bluff 3, Cercado de Mao (very abundant); Zone D, Rio Gurabo at Los Quemados.

Murex domingensis Sowerby

Plate 16, Figures 3, 4, 5, 6

Murex Domingensis Sowerby, Quart. Jour. Geol. Soc., vol. 6, p. 49,

pl. 10, fig. 5, 1849.
M. Domingensis Guppy, Quart. Jour., vol. 22, p. 288, 1866.
M. Domingensis Gabb. Trans. Amer. Phil. Soc., vol. 15, p. 201, 1873.
M. domingensis Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1584, 1903.
M. recurvirostris domingensis Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., pp. 353—354, 1911.

Closely allied to this species is *M. yaquensis* (*antillarum* Gabb, name preoccupied). That typically is high spired, slender, fusiform, while *M. domingensis* has a broad ovate form, a low spire, and three, instead of four or five intervarical ribs. But we have specimens of *domingensis* with the ribbing of *yaquensis.*

M. domingensis is apparently the ancestor of the recent *M. antillarum* Hinds (*nodatus* Reeve) which Tryon, I think erroneously, united with *M. recurirostris* Broderip. *M. antillarum* Hinds is living on the beach at Monte Cristi. It has the form of *M. domingensis* but the canal is longer and the spines much more developed.

M. domingensis has been found at Bowden, Cumana, and the Caroni Series of Trinidad (Guppy).

Localities.—(Exp'd '16) Large, typical shells with three intervarical ribs, on the Guayabin to Mao road, Rio Cana; the mutation, with four or five intervarical ribs, approaching *M. yaquensis*, Bluff 1, Cercado de Mao, and Zone F, Rio Gurabo. An extraordinarily large specimen (Fig. 6), 74×42 mm, apparently referable to *M. domingenis*, Bluff 1, Cercado de Mao.

Murex yaquensis, n. sp.

Plate 16, Figure 7

M. antillarum Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 202, 1873.
Not *M. antillarum* Hinds, Proc. Zool. Soc. p. 126, 1843.
M. antillarum Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 521, 1873.

As Gabb's name is preoccupied by Hinds, the fossil requires a new name and *yaquensis* seems appropriate.

This species intergrades with *M. domingensis.* I have specimens with the form of the latter and the ribbing of the former species. Our typical shell is a metatype of Gabb's *antillarum.*

Murex compactus Gabb

Plate 16, Figure 8

Murex (*Pteronotus*) *compactus* Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 202, 1873.

M. compactus Dall, Trans. Wagner, Inst., vol. 3, pt. 1. p. 142. Not *textilis* Gabb.

M. compactus has much the general aspect of *M. incisus* Broderip living on the west coast, but the varices of the fossil species are more ornate. Our shell is a metatype sent by Professor Gabb from Santo Domingo.

Murex (*Phyllonotus*) *cornurectus* Guppy

Plate 16, Figures 9, 10

M. (*Chicoreus*) *megacerus* Gabb, Trans. Amer. Phil. Soc., vol, 15, p. 202, 1873. Not *M. megacerus* Sowerby.

M. cornurectus Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 521, pl. 28, fig. 4, 1876.

Our fossils fall into two groups:—(1) larger shells, identical with those sent by Gabb as *M. megacerus*, and exactly like specimens from the Monte Cristi beach; (2) smaller shells identical with Guppy's *M. cornurectus*, but also apparently the same as the larger shells. Dr. Dall on being asked whether both should be referred to *brevifrons*, replied that it would be better to call them *cornurectus* since, "the question of what *brevifrons* really is, needs study. I feel there may be more than one species In the series called *brevifrons*."

Localities. — (Exp'd '16) Bluffs 1, 2, 3, Cercado de Mao (abundant in 3); Zones D and F, Rio Gurabo at Los Quemados; Zones H and I, Rio Cana at Caimito; Cerro Gordo to Mao road, and Guayubin to Mao road.

Murex (*Phyllonotus*) *præpauxillus*, n. sp.

Plate 16, Figure 11

Shell with seven whorls, the first two smooth, nuclear, later whorls with low crenate varices, six to a whorl, and three main, crenate ridges revolving around the periphery. The uppermost spiral of each trio carinates the whorl, and on crossing the varices forms short, hollow spines; aperture narrowly elliptical; canal open, somewhat reflexed; outer lip edged by the final fimbriated varix and bearing within five well-marked denticles. Length 16, width 7 mm.

This species is named from its resemblance to *M. pauxillus* A. Adams, living on the northwest coast of Mexico at Mazatlan. The fossil appears to be the ancestor of this shell.

Locality.— (Exp'd '16.) Zone D, Rio Gurabo at Los Quemados.

Genus ASPELLA Moerch

Aspella scalarioides Blainville

Plate 17, Figure 11

Murex scalarioides Blainville, Faune Française, p. 131, pl. 5, figs. 5, 6, 1826.

Aspella ? scalarioides Dall, Bull. Mus. Comp. Zool. Harv. Coll., vol. 18, p. 208, 1889.

Aspella scalarioides Dall and Simpson, Bull. U. S. Fish Comm., vol. 20, pt. 1, p. 410. 1900.

Dr. Dall very kindly examined our specimen and decided it was identical with the recent species living in the Antilles and the Mediterranean.

Locality.—(Exp'd '16) Zone D, Gurabo at Los Quemados.

Genus CYMIA Moerch

Cymia Henekeni, n. sp.

Plate 17, Figure 1

Cuma tectum Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 214, 1873. Not of Kiener, Chemnitz, or Reeve.

Cuma tectum Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 524, 1876.

Cymia Woodii Dall (in part) Trans. Wagner Inst. Sci., vol. 3, pt, 1, p. 155, 1890.

Purpura (*Cuma*) *Woodii* Guppy, Trans, Canadian Inst., p. 390, 1909.

Cymia Woodii Maury, Jour. Acad. Nat. Sci. Phila., 2d ser., vol. 15, p. 82, pl. 11, figs. 9, 10, 1912.

We have a number of specimens from Santo Domingo sent by Professor Gabb as *Cuma tectum.* A comparison of these with shells of the recent *C. tectum* collected by Dr. Newcomb on the coast of Ecuador, leads one to the conclusion that the fossil and recent shells are not identical. The fossils resemble those we obtained some years ago in a deposit of asphaltum in Trinidad. At that time I followed Dr. Dall in identifying them with Gabb's *C. Woodii* from the Shiloh marls, New Jersey. But the typical shells are very different and it seems best to designate the Dominican and Trinidadian form by a distinctive name. For this *Henekeni* would seem appropriate, since Colonel Heneken first collected fossil shells in Santo Domingo.

Genus CORALLIOPHILA Adams

Coralliophila miocenica Guppy

Plate 18, Figure 6

Purpura miocenica Guppy, Geol. Mag. London, p. 410, pl. 16, fig. 9, 1874.

Coralliophila miocenica Dall, Trans. Wagner, Inst., vol. 3, pt. 6, p. 1584, 1903.

Coralliphila miocenica has not been reported before outside of Jamaica. Our Dominican shells resemble Guppy's figure, but the canal is somewhat shorter. Possibly they represent a variety of the Jamaican species.

Localities.— (Exp'd '16) Zone D, Rio Gurabo at Los Quemados.

C. SUPER-FAMILY TÆNIOGLOSSA

Genus SIMPULUM Klein

Simpulum pileare Lamarck

Triton pileare Lamarck, An. sans Vert., 7, p. 82, 1822.

Triton pileare Kiener, Icon. Coq., Viv. p. 15,pl. 7, fig. 1.

Tritonium lineatum Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 211, 1873.

Tritonium pileare Dall, Trans. Wagner Inst., vol. 3, pt. 1, page 161, 1890.

Lampusia pilearis Dall and Simpson, Bull. U. S. Fish Comm., vol. 20, pt. 1, p. 417, for 1900 (1902).

A fragment from the Rio Gurabo bluffs agrees in form and sculpture with shells of *S. pileare* from the Monte Cristi beach, but the fossil has dorsal humps recalling those of *S. chlorostomum*. In the Newcomb collection, however, there are specimens of *pileare* from the Philippines with similar humps. Gabb referred his specimen to the related, perhaps identical shell, *S. lineatum* from the Gallopagos Islands.

Locality.— (Exp'd '16) Zone B, Rio Gurabo at Los Quemados.

Simpulum antillarum variety *cercadicum*, n. var.

Plate 17, Figure 2

Cf. *Triton antillarum* d'Orbigny, De la Sagra, Hist. Pol. y Nat. Isla de Cuba, vol. 5, p. 248, 1845; Atlas pl. 23, fig. 20, 1855.

Shell intermediate between d'Orbigny's two recent species, *S. antillarum* and *S. americanum*, resembling the first in form and the second in the callus and wrinkles of the inner lip. Length 45, width 24 mm. Tryon places *antillarum* in the synonymy of *tuberosum* Lamarck, of which we have specimens from the Monte Cristi beach. It is quite a different shell with the porcellanous callus of a true *Gutturnium*, while our fossil shells are referable to *Simpulum*.

Locality.— (Exp'd '16) Bluff 3, Cercado de Mao.

Genus LOTORIUM Montfort

Lotorium præfemorale, n. sp.

Plate 17, Figure 3

Tritonium (*Cymatium*) *femorale* Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 211, 1873. Not *Triton femoralis* Linné.

Triton femoralis Guppy, Geol. Mag. London, p. 438, 1874. Not of Linné.

Triton femoralis Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 522, 1866. Not of Linné.

Shell resembling the recent *L. femorale* Linné, but differing in the following respects:—(1) the spire is fusiform in the early stages, the whorls not carinate, nor coronate. In *femorale* the spire is fulguriform, coronated by a single row of tubercles; (2) the aperture is ovate in the fossil, biangulate in the recent.

Our party collected the recent shell on the beach at Monte Cristi. It is the descendant of the ancestral species fossilized in the river bluffs.

Locality.—(Exp'd '16) Zone F, Rio Gurabo at Los Quemados.

Genus GUTTURNIUM Adams

Gutturnium gracile variety *gurabonicum*, n. var.

Plate 17, Figure 10

Cf. *Triton gracilis* Reeve, Conch. Icon., fig. 58 a, b.

Shell resembling specimens of *G. gracilis* Reeve, living in the Antilles, but with more prominent dorsal humps, shorter canal, and surface much more finely reticulated. Length of decollate shell 23, width 12 mm.

This shell has some resemblance to Gabb's *Triton domingensis* (See Guppy's figure, Quart. Jour. Geol. Soc., vol. 32, pl. 29, fig. 2) but that species has an elongate aperture and nearly straight canal while ours has a round aperture and sharply twisted canal.

Locality.—(Exp'd'16) Zone D, Rio Gurabo at Los Quemados.

Genus DISTORTRIX Link

Distortrix simillima Sowerby.

Plate 17, Figures 4, 5

Triton simillimus Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 48, 1849.

Persona simillima Guppy, Quart. Jour. Geol. Soc. vol. 22, p. 288, pl. 17, fig. 13, 1866.

Distortia simillimus Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 212, 1873.

Persona simillima Guppy, Geol. Mag. London, p. 439, 1874: Quart. Jour. Geol. Soc., vol. 32, p. 522, 1876.

Distortrix simillima Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1584, 1903.

Distorsio (*Distortrix*, *Persona*) *gatunensis* Toula, Jahrb. der K.—K. Geol. Reichsanstalt Wien, vol. 58, p. 700, pl. 25, fig. 10, 1908.

Distorsio gatunensis Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., p. 356, pl. 26, fig. 8, 1911.

Toula's type of *D. gatunensis* was an immature shell. Brown and Pilsbry have figured a larger specimen which is so like some of our Dominican shells that they seem entirely identical. The more so, since a very fine shell we collected has the embryonic whorls perfectly preserved and they correspond to Brown's and Pilbry's description of the protoconch of *D. gatunensis.*

Gabb notes the resemblance of the Dominican fossil *Distortrix* to the West Coast *D. constricta*; but it is much more like specimens from St. Thomas, W. I., labelled by Dr. Newcomb *ridens* Reeve.

Localities.— (Exp'd '16) Zones A, B, D, E, Rio Gurabo at Los Quemados; Bluff 1, Cercado de Mao. (Very large and abundant).

Genus BURSA Bolten

Bursa crassa Dillwyn

Plate 17, Figure 6, 7

Ranella crassa Dillwyn, Reeve, Icon., fig. 18, b.

Ranella crassa Guppy, Quart. Jour. Geol. Soc., London, vol. 22, p. 288, pl. 18, fig. 9, 1866.

Bursa crassa Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 212, 1873.

Ranella crassa Guppy, Geol. Mag. London, p. 438, 1874; Quart. Jour. Geol. Soc., vol. 32, p. 522, 1876.

Gyrineum crassum Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1584, 1903.

This species is still living on unchanged in the Antilles. It occurs as a fossil at Bowden and in Santo Domingo.

Localities.—(Exp'd '16) Rio Cana, Guayubin to Mao road, and Cerro Gordo to Mao road.

Bursa bufoniopsis, n. sp.

Plate 17, Figure 8

Shell somewhat flattened dorso-ventrally, whorls seven, the first two nuclear, subsequent volutions with two lateral varices each; varices rounded, their sculpture corresponding to the spiral ornamentation of the shell but rather more pronounced; intervarical tubercles three, often with a fourth, weaker tubercle on the dorsal side of the last two whorls; body whorl on the dorsal surface showing about nine spirals of which the uppermost is nodular, the second, third, fifth, seventh and ninth are single, beaded, the fourth, sixth and eighth are paired, beaded. Aperture oval, outer lip slightly reflexed, fluted, bearing nine interrupted denticles on its margin and far within, beyond the groove corresponding to the varix, another row of seven smaller denticles. Inner lip strongly and closely wrinkled its entire length, upper (posterior) canal produced into a spout-like gutter, those of the last three whorls persisting on opposite sides of the varices; lower canal short, reflexed. Length 37, width 24 mm.

This shell resembles the recent, larger Oriental *B. bufonia* Lamarck in the characters of the aperture; abrupt reflexion of the anterior canal and spout-like extension of the posterior canal. The latter feature separates it from *B. Thomæ* d'Orbigny.

Locality.— (Exp'd '16) Zones B and D, Rio Gurabo at Los Quemados.

Bursa Amphitrites, n. sp,

Plate 17, Figure 9

Shell with two varices to each whorl, the varices markedly discontinuous, *Triton*-like, resembling those of *B. scrobiculator*, rounded, their sculpture conforming to the spiral structure of the whorls; intervarical tubercles seven to nine, small, rounded; whorls seven and a half convex, not flattened dorso - ventrally as in *B. bufoniopsis*, the first two and a half volutions are smooth, nuclear, the third is decorated with two rows of minute tubercles after which the beaded spiral threads appear. The spiral sculpture of the last whorl consists of a row of bead-like nodules beneath the suture followed by a very fine beaded spiral thread, a row of smaller nodules, a fine beaded thread, a row of nine rather small, rounded, intervarical tubercles, followed by five nodular spirals each alternating with a fine beaded thread. Aperture oval; outer lip fluted, reflexed anteriorly, bearing within about ten strong liræ some of which are double; inner lip extremely rugose, wrinkled its entire length; upper (posterior) canal U-shaped, apparently not much produced; anterior canal slightly reflexed. Length 46, greatest width 27 mm.

This handsome species resembles the recent *B. affinis* Broderip, but differs in the discontinuous varices; the nearly straight columella; and more numerous intervarical tubercles.

Localities.—(Exp'd'16) Rio Amina, between Hato Viejo and Potrero; Bluff 3, Cercado de Mao.

Genus CASSIS Lamarck

Cassis sulcifera Sowerby

Plate 18, Figures 1, 2, 3

Cassis sulcifera Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 47, pl. 10, fig. 1, 1849.
Cassis sulcifera Guppy, Quart. Jour., Geol. Soc., vol. 22, p. 286, 1866.
Cassis sulcifera Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 222, 1873.
Cassis sulcifera Guppy, Geol. Mag. London, p. 439, 1874; Quart. Jour. Geol. Soc. London, vol. 32, p. 525, 1876.
Cassis sulcifera Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1584, 1903; Proc. U. S. Nat. Mus., vol. 51, No. 2162, p. 508, pl. 86, fig. 4, 1916.

This fine shell exhibits such diverse aspects in youth and in old age as to appear, without a connecting series, two different species. The descendant is *C. tuberosa* Linné which we collected on the Monte Cristi beach.

C. sulcifera has been found at Bowden and in the Flint River Oligocene, Georgia. It is abundant in Santo Domingo.

Localities.— (Exp'd '16) Bluffs 1, 2, 3, Cercado de Mao; Zones C, B, E, D, F, Rio Gurabo, at Los Quemados; Zones H and I, Rio Cana at Caimito.

Subgenus PHALIUM Link

Phalium moniliferum Guppy

Plate 18, Figures 4, 5; Plate 19, Figure 1

Cassis monilifera Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 287, pl. 17, fig. 8, 1866.
Cassidea granulosa Gabb, Trans. Amer. Phil. Soc., vol. 15. p. 222, 1873. Not *C. granulosa* Bruguière. Exclude synonymy.
Cassis reclusa Guppy, Geol. Mag. London, pp. 434, 439, 1874; Quart. Jour. Geol. Soc., London, vol. 32, p. 525, 1876.
Cassis monilifera Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 525, 1876.
Cassis reclusa Dall, Trans. Wagner, Inst. Sci., vol. 3, pt. 6. p. 1584, 1903.

There is no constant point of difference between *C. monilifera* and *C. reclusa* and intermediate forms connect the two, but the extremes are unlike in aspect. I have designated our shells which resemble the latteras *P. moniliferum reclusum* Guppy. Both forms occur at Bowden.

Localities.—(Exp'd '16) *P. moniliferum*, Zones H and I, Rio Cana at Caimito; Zone G, Rio Gurabo at Los Quemados; Bluff 3, Cerado de Mao; *P. moniliferum reclusum*, Bluff 3, Cercado de Mao.

Subgenus CYPRÆCASSIS Stutchbury

Cypræcassis testiculus Linné

Cypræcassis testiculus Linné *fide* Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 222, 1873.

We have a specimen from Gabb of this shell. The recent range is from the Antilles to Hatteras.

Genus SCONSIA Gray

Sconsia lævigata Sowerby

Plate 19, Figure 2

Cassidaria lævigata Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p, 47, pl. 10, fig. 2, 1849.

Cassidaria sublævigata Guppy, *Idem*, vol. 22, p. 287, pl, 27, fig. 9, 1866.

Cassidaria lævigata Guppy, Geol. Mag. London, p. 439, 1874; Quart. Jour. Geol. Soc., London, vol. 32, p. 525, 1876.

Sconsia lævigata Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., p. 356, 1911.

We have a large series of all ages and sizes of this fine species, exhibiting all gradations from smooth to striate. Among them are specimens exactly like Sowerby's *lævigata* and Guppy's Jamaican *sublævigata*. I have vainly attempted to satisfactorily separate out the latter as a variety.

Only three living species are known. Of these, *S. barbudensis* Higgins and Maratt, dredged off Barbuda, seems the nearest to the fossil, and its possible descendant.

S. lævigata occurs also at Gatun.

Localities. — (Exp'd '16) Zones A, B, D, E, F, Rio Gurabo at Los Quemados; Bluff 1, Cercado de Mao. (Abundant.)

Genus MORUM Bolten

Morum domingense Sowerby

Plate 18, Figures 7, 8

Oniscia Domingensis Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 47, pl. 10, fig. 3, 1849.

Cf, *Oniscia harpula* Conrad, Proc. Acad. Nat, Sci. Phila., p. 288, 1847, Jour., p. 119, pl. 12, fig. 6.

Morum Domingense Gabb, Trans. Amer. Phil. Soc., vol. 15,p. 223, 1873.

Oniscia domingensis Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 525, 1876.

Lambidium domingense Dall, Trans. Wagner Inst., vol. 3, pt. 6, p. 1567, 1903.

Morium domingense Dall, Bull. 90, U. S. Nat. Museum, p. 85, pl. 12. fig. 28, 1915.

Conrad considered this species identical with his *Oniscia harpula* from the Vicksburg Oligocene; but.Gabb pronounced the Santo Domingo species "very different." We have no specimen of the Vicksburg shell, but the description and figure are remarkably like the Dominician shells. The fossil series is *M. harpula*, *chipolanum* and *domingense*. The living representative is *M. Dennisoni* Reeve, of the Lesser Antilles. *M. domingense* is one of the few species common to the Tampa silex beds and the Santo Domingo blue clays.

Localities.—(Exp'd '16) Bluff 1, Cercado de Mao; Zones D, E, F, Rio Gurabo at Los Quemados.

Genus DOLIUM Lamarck

Subgenus MALEA Valenciennes

Malea camura Guppy

Plate 19, Figure 3

Malea camura Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 287, pl. 17, fig. 9, 1866.

Malea ringens Gabb, (in part) Trans. Amer. Phil. Soc., vol. 15, p. 223, 1873.

Malea camura Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 525, 1876.

Malea camura Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1584, 1903.

Malea camura Brown and Pilsbry. Proc. Acad. Nat. Sci. Phila., p. 356, 1911.

We have a large series, some of the younger shells being very like Guppy's immature, Jamaican type. The nearest living ally and descendant is the West Coast *M. ringens* Swainson. Some of our shells with fewer spiral bands look like *M. promum*, but the characters of the aperture are more those of *ringens*. A mutation from Zone F, Rio Gurabo has closer ribs, about 20.

M. camura occurs at Bowden and is doubtfully reported from Gatun.

Localities.—Zones F, G, Rio Gurabo at Los Quemados; Bluffs 2 and 3 (Very abundant, all sizes), Cercado de Mao.

Malea, species indet.

A very large species, 110 mm. in diameter, nearly twice as large as *M. camura*, was found in Zone I, Rio Cana at Caimito, but is too imperfect to describe.

Genus PYRULA Lamarck

Pyrula Pilsbryi Smith

Pyrula pilsbryi Smith, Proc. Acad. Nat. Sci. Phila., p. 213, fig., 1 1907.

In this species the surface between the primary spirals is flat, not concave as in *P. carbasea* Guppy from the Caroni Series, Trinidad. The type locality of *P. Pilsbryi* is Bowden.

Locality.—(Exp'd '16). Zone I, Rio Cana at Caimito.

Genus OVULA Bruguière

Ovula (*Neosimnia*) *Wise-Woodæ*, n. sp.

Plate 22, Figure 17

Shell resembling *O. spelta* in outline, smooth except for fine, wavy spirals near the extremities and delicate longitudinal growth-lines; outer lip markedly arcuate, bordered by a callus band; dorsal surface convex, with a slight but obvious hump most apparent on the latter half of the body whorl; columella with one very strong posterior plication; posterior canal sharply reflexed. Length 14, width 6 mm.

This is the first *Ovula* ever found in the Dominican blue clays.

Guppy's Bowden *O. immunita* is slenderer and longer, the lip rectilinear and no hump is mentioned. The recent *O. uniplicata* is much more delicate and slender but of the same group.

This rare and pretty shell is named in honor of Mrs. Henry A. Wise-Wood of New York City.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (A single shell).

Genus CYPRÆA Linné

Cypræa Henekeni Sowerby

Plate 19, Figure 4

Cypræa Henikeri Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 45, pl. 9, fig. 3, 1849.

Cypræa Henekeni Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 235, 1873.

Cypræa Henekeni Guppy, Geol. Mag. London, p. 440, 1874; Quart. Jour. Geol. Soc., vol. 32, p. 528, 1876.

Cypræa Henekeni Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 165, 1890.

Cypræa Henekeni Brown and Pilsbry, Proc. Acad. Nat. Sci., Phila., p. 356, 1911.

C. Henekeni appears to be the forerunner of *C. mus* now living in the Atlantic Ocean and Mediterranien Sea. Typical specimens are especially like the variety *bicornis* Sowerby in form. The color marking of *Henekeni*, however, is different. It consists of large light spots in a dark network, forming an open reticulated design.

A variety of *C. Henekeni* occurs at Gatun.

Localities.—(Exp' '16) Bluff 1, Cercado de Mao; Zones E, G, Rio Gurabo at Los Quemados; Zones H and I, Rio Cana at Caimito.

Cypræa Noueli, n. sp.

Plate 19, Figure 5

Shell large, exceedingly globose, showing the apex of the spire, aperture somewhat curved; inner lip with about sixteen rather weak teeth, the strongest anterior; outer lip with about twenty teeth, also strongest anteriorly and fading out posteriorly; upper margin of outer lip projecting; surface of shell entirely smooth, with traces on the back of a color pattern of white spots of varying size on a dark ground. Length of shell 60, width 44, thickness 39 mm.

This splendid cowry is about the size of *C. Henekeni*, but more globose and with no traces of dorsal tubercles, nor lateral corrugations, with a different color pattern, and with the apex of the spire visible.

I take the liberty of naming this species in honor of Archbishop Nouel of Santo Domingo, whom I had the honor of meeting in his beautiful and historic Cathedral.

Locality.— (Exp'd '16) Bluff 1, Cercado de Mao.

Cypræa spurca Linné

Plate 19, Figure 6

Cypræa spurca Linné, Syst. Nat., ed. 10, page 724, 1758.
Cypræa spurca Reeve, Conch. Icon., 3, pl. 14, fig. 68, 1845.
Cypræa spurca Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 235, 1873.
Cypræa spurca Dall and Simpson, Bull. U. S. Fish Comm., vol. 20, pt. 1, page 420, 1900.

I can find no points of difference between the fossils and recent specimens from the Antilles of *C. spurca.*

Localities. — (Exp'd '16) Bluff 1, Cercado de Mao; Zone I, Rio Cana at Caimito. (Rare).

Cypræa spurcoides Gabb

Plate 19, Figures 7, 8,9

Cypræa spurcoides Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 235, 1873.

Gabb remarks that the cremulations are more numerous on the inner than the outer lip of *spurcoides*, but his metatypes show the reverse. This unfigured species has not been reported outside of Santo Domingo.

Localities.—(Exp'd '16) Bluff 1, Cerado de Mao; Zone D, Rio Gurabo at Los Quemados.

Cypræa patrespatriæ, n. sp.

Plate 19, Figure 10

Cypræa Isabella Gabb, Trans. Amer. Phil. Soc., vol. 15. p. 235, 1873.
Not *Cypræa Isabella* Linné, Syst. Nat., p. 1177, 1767.

We have a specimen of Gabb's labelled by him *C. Isabella* Linné, from Santo Domingo. But on comparing it with a shell of that species from Ceylon the resemblance is only one of general type. The fossil is sub-cylindrical; aperture nearly straight, very narrow; teeth numerous, fine, thirty-three on the outer lip. Length 28, width 14, thickness 11 mm.

We collected some shells resembling Gabb's. The specific name proposed is in honor of the three liberators of the Dominican Republic.

Locality.—(Exp'd' '16) Bluff 1, Cercado de Mao.

Cypræa dominicensis ? Gabb

Plate 19, Figure 11

Cypræa Dominicensis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 236, 1873.

Judging from Gabb's brief description our specimens are his unfigured *C. dominicensis.*

Locality.— (Exp'd '16) Zone D, Rio Gurabo at Los Quemados.

Cypræa (*Pustularia*) *Gabbiana* Guppy

Plate 19, Figure 12

Pustularia nucleus Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 236, 1873. Not of Linné.
Cypræa pustulata Guppy, Geol. Mag. London, p. 440, 1874. Not of Lamarck.
Cypræa Gabbiana Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 528-529, pl. 29, fig. 10, 1876.
Cypræa Gabbiana Dall, Trans. Wagner, Inst. Sci., vol. 3, pt. 1. p. 165, 1890.

This beautiful little *Cypræa* resembles the recent Oriental *C. nucleus.* It is very rare in Santo Domingo and has not been found elsewhere.

Locality.—(Exp'd'16) Zone D, Rio Gurabo at Los Quemados.

Genus TRIVIA Gray

Trivia globosa Gray

Plate 19, Figure 13,

Trivia globosa Gray, Sowerby's Thesaurus, Cypræa, figs. 429, 431.
Trivia globosa Dall, Bull. 37 U. S. Nat. Mus., p. 136, 1889; Trans. Wagner Inst. Sci., vol. 3. pt. 1, p. 168, 1890; *Id.* pt. 6, p. 1584, 1903.

We have several specimens agreeing in form and size with recent shells of *T. globosa* but the furrow is not quite so deep and the ribs are worn so as to appear double. This species is living in the Antilles and is found as a fossil at Bowden.

Localities.— (Exp'd '16) Zone I, Rio Cana at Caimito. (Rare).

Trivia islahispaniolæ, n. sp.

Plate 19, Figure 14

Shell sub-pisiform, very ventricose, slightly produced and notched anteriorly and with the lips, especially the outer, flaring a trifle posteriorly, sharply sculptured with well defined ribs of which there are about twenty-three on the outer and twenty on the inner lip; dorsal surface evenly convex with only the faintest suggestion of a sulcus over which the ribs continue without any interruption, aperture narrow. Length of shell 7, breadth 5, altitude 5 mm.

This shell resembes *T. globosa* but that species is smaller and the dorsal furrow is sharply cut, extending almost to the extremities.

Locality.—(Exp'd '16)Bluff 3, Cercado de Mao. (Very rare.)

Trivia suffusa variety *Sancti-Dominici*, n; sp.

Plate 19, Figure 15,

Shell resembling *T. suffusa* but more convex, slightly produced and truncate anteriorly; outer lip somewhat elevated above the last whorl and sub-angulate posteriorly; ribs fine, 35 on the outer margin of the outer lip and 25 on the inner lip; dorsal furrow very straight and sharp on one shell, less sharply defined on

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the other; aperture narrow widening very slightly anteriorly. Length 8, width 5.50, altitude 5 mm.

The fossils differ from *T. suffusa*, now living in the Antilles and fossil at Bowden, in their more convex form and narrower and straighter aperture.

Our three species of *Trivia* are the first ever found in the Santo Domingo blue clays.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (Rare).

Genus ERATO Risso

Erato Maugeriæ variety *domingensis*, n. var.

Plate 21, Figure 8

Shell minutely ficiform, whorls three, suture indistinct, spire very short, obtuse, last whorl very globose posteriorly, contracted and slightly produced anteriorly; aperture linear, nearly as long as the shell, margin of outer lip much thickened, minutely crenulated within; inner lip perfectly smooth except for a longitudinal ridge. Length 4, width 3.25 mm. The species differs from *E. Maugeriæ*, which we collected on the Monte Cristi beach and is found as a fossil at Bowden, in the following respects:—it is smaller, more contracted and produced anteriorly, the inner lip is smooth and has the longitudinal ridge, while the inner lip of the recent shell has no ridge but a dozen sharp denticles extending its entire length.

Locality.—(Exp'd '16,) Bluff 3, Cercado de Mao.

Genus STROMBUS Linné

Strombus haitensis Sowerby

Plate 20, Figure 1

Strombus haitensis Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 48, pl. 9, fig. 7, 1849.

Strombus bituberculatus Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 233 1873. Not *bituberculatus* Lamarck.

Strombus haitensis Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 521 1876.

This species differs from *S. bituberculatus*, of which we found beautiful shells on the Monte Cristi beach, in the following respects:—the recent has the lobe of the outer lip more produced, the second row of spines much smaller and a third row is introduced at the base. Evidently it is the direct descendant of the fossil. The latter also occurs at Bowden.

Localities.—(Exp'd '16) Bluff 1, Cercado de Mao; Zones A, E, G, F, Rio Gurabo at Los Quemados.

Strombus bifrons, Sowerby

Plate 20, Figures 2, 3

Strombus bifrons Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 48, pl. 9, fig. 9, 1849.

Strombus bifrons Guppy, Quart. Jour., vol. 32, p. 287, 1866.

Strombus pugilis Gabb, (in part) Trans. Amer. Phil. Soc., vol. 15, p. 233, 1873. Not *pugilis* Linné.

Strombus bifrons Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 521, 1876.

Strombus bifrons Dall, Trans. Wagner Inst., vol. 3, pt. 1, p. 176, 177, 1890; *Id.* part 6, p. 1584, 1903.

Sowerby distinguished his unfigured *S. ambiguus* from *bifrons* by the absence of rugations on the posterior part of the inner lip of *bifrons*. But this is not a constant character. Some of our shells have five, three, none, yet evidently are the same species, and closely resemble Sowerby's figure of *bifrons*.

This graceful shell is like the recent Oriental *S. columba*. It has a slight resemblance to Toula's *S. gatunensis*, but in that species the spines on the shoulder are obsolete. Of Floridian fossil species it seems nearest *S. Aldrichi* Dall. Our fossil is also found at Bowden.

Localities.—(Exp'd '16) Bluffs 1 and 3, Cercado de Mao; Zones A, E, F, Rio Gurabo at Los Quemados; Zone H, Rio Cana at Caimito.

Strombus proximus Sowerby

Plate 20, Figures 4, 5

Strombus proximus Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 48, pl. 9, fig. 8, 1849.

Strombus pugilis Gabb, (in part) Trans. Amer. Phil. Soc., vol. 15, p. 233, 1873. Not *pugilis* Linné. Exclude other synonyms.

Strombus proximus Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 521, 1876.

Strombus pugilis Dall, (in part) Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 177, 1890. Not *pugilis* Linné

This shell has a general resemblance to *S. gracilior* Sowerby, living off Panama. The spirals may, as in the type, cover the entire surface or be obsolete except on the spire. The last whorl may be deeply sculptured with grooves and cords or almost smooth. The characters of the spire are the most contant feature.

Localities.—(Exp'd '16) Bluffs 1 and 3, Cercado de Mao; Zone E, Rio Gurabo at Los Quemados; Zone I, Rio Cana at Caimito.

Strombus pugiloides Guppy

Plate 20, Figure 6

Strombus pugilis Guppy, Quart. Jour. Geol. Soc., vol. 22, p. 287, 1866.

Strombus pugilis Gabb, (in part) Trans. Amer. Phil. Soc., vol., 15, p. 233, 1873.

Strombus pugiloides Guppy, Geol. Mag. New. Ser. Decade 2, vol. 1, p. 433, 1874.

Strombus pugilis Dall, (in part) Trans. Wagner Inst. Sci., vol. 3, pt. 1, p. 177, 1890.

Shell resembling *S. pugilis* Linné, abundant on the Monte Cristi beach, but the fossil is devoid of spines and smaller, measuring 60×36 against 83×52 mm. The recent is the descendant of *S. pugiloides* just as *bituberculatus* is of *haitensis*.

Locality.—(Exp'd '16) Rio Cana on the Guayabin to Mao road.

Strombus maoensis, n. sp.

Plate 21, Figure 1

Shell rather large, remaining whorls eight, the last five all tuberculate. On earlier whorls the tubercles are small, close-set and over-run by spiral threads; they gradually increase in size and diminish in number so that on the dorsal side of the last whorl there are but three or four very strong, conspicuous spines, and on the oral surface of the last whorl the spines are entirely obsolete. The spiral sculpture on the body whorl consists of more or less obsolete, wavy ridges tending to alternate with spiral threads. Columella with a thick wash of callus, canal strongly reflexed. Length 94, width 55 mm.

Our fossil resembles the recent S. (*Monodactylus*) *gallus* Linné. But on comparing it with specimens of *gallus* from Tortola, the latter is seen to have a much narrower spire, with tubercles absent from the two whorls preceding the last then reappearing, and the body is strongly spirally sculptured.

Locality.—(Exp'd '16) Bluff 1, Cercado de Mao.

Genus ORTHAULAX Gabb

Orthaulax inornatus Gabb

Plate 21, Figure 11

Orthaulax inornatus Gabb, Proc. Acad. Nat. Sci. Phila., vol. 24, p. 272, pl. 9, figs. 3, 4, 1872; Trans. Amer. Phil. Soc., vol. 15, p. 235, 1873.

Orthaulax inornatus Guppy, Quart. Jour. Geol. Soc., London, vol. 32, p. 520, 1876.

Orthaulax inornatus Dall, Trans. Wagner Inst. Sci., vol 3, pt. 1, p. 169, 1890: Bull. 90, U. S. Nat. Mus., p. 86, pl. 11, fig. 4, 1915.

The genus *Orthaulax* occurs in Santo Domingo, Cuba, Antigua, Tampa silex beds, Bainbridge (Georgia), lower bed of Alum Bluff, and the Chipola marls, Florida. It has not been found in the Bowden beds.

Gabb's species, *O. inornatus* is the genotype described from Santo Domingo. Dr. Dall has found it in the White Beach limestone and the Tampa silex bed, Florida.

Genus CREPITACELLA Guppy

Crepitacella cepula Guppy

Plate 21, Figure 9

Melanopsis cepula Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 580, pl. 26, fig. 14, 1866.

Crepitacella cepula Guppy, Geol. Mag. London, vol. 4, p. 500, 1867.

Dolophanes melanoides Gabb, Proc. Acad. Nat. Sci, Phila., vol. 24, p. 273, pl. 11, fig. 7, 1872.

Dolophanes melanioides Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 235, 1873.
Crepitacella cepula Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 524, 1876.
Crepitacella cepula Guppy and Dall, Proc. U. S. Nat. Mus., vol. 19, no. 1110, p. 328, 1896.
Crepitacella cepula Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1585, 1903.

For this interesting shell Gabb created in 1873 the genus *Dolophanes*. But Guppy in 1866 had described a similar shell from Cumana as *Melanopsis cepula*, for which the following year he founded the genus *Crepitacella*. Guppy and Dall found the Cumana and Dominican species identical.

The probable descendant is the deep sea *C. Gabbi* Dall, which unlike its tropical ancestor lives in nearly freezing water at a depth of 785 fathoms in sand and ooze.

Localities. — (Exp'd '16) Bluff 1, Cercado de Mao; Zone B, Rio Gurabo at Los Quemados. (Rare).

Crepitacella cepula variety *spiralistriata*, n. var,

Plate 21, Figure 10

Shell resembling *C. cepula* Gabb, but with stronger sculpture, longitudinal riblets closer, higher, more conspicuously coronated on the shoulder angle; surface ornamented with fine, close spiral threads. Length 15, width 6 mm.

Gabb found similar spirally striate specimens.

Locality. — (Exp'd '16) Zone B, Rio Gurabo at Los Quemados. (Rare).

Genus TRIFORIS Deshayes

Triforis Calypsonis, n. sp.

Plate 21, Figure 13

Shell of medium size with slightly curving sides; suture deep; protoconch of about two whorls, each with two strong adjacent spirals, crossed by many oblique riblets; post-nuclear whorls thirteen, the first five with two strong spirals cut into coarse granules by the longitudinal ribs, on the following whorls a third spiral appears between the two and on the later whorls becomes equally strong; the last volution has a peripheral spiral and two less strongly beaded basal spirals: ribs straight, twenty-one on the last whorl extending from the umbilical region across the spirals to the suture, forming square pits between the spirals and ribs; aperture large, round; outer lip thin, flaring, with a trace of a posterior sinus; anterior canal tubular, closed. Length 9.5, width 2.25 mm.

Genus CERITHIUM Adanson

Cerithium microlineatum Gabb

Plate 22, Figure 1

Cerithium microlineatum Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 236, 1873.

This unfigured species has heretofore only been recorded by Gabb.

Localities. — (Exp'd '16) Zone D (Abundant), Zone E (Rare), Rio Gurabo near Los Quemados.

Cerithium Russelli, n. sp.

Plate 22, Figures 2, 3

Shell with many whorls carinated by a row of tubercles beneath the sub-sutural sulcus; upper whorls with two narrow, well-defined varices, obsolete on the penultimate but represented on the ultimate whorl by one large, irregularly rounded varix; the first five whorls following the protoconch are ribbed, the riblets then break up into a larger and a smaller row of tubercles separated by the sub-sutural sulcus; entire surface of the shell sculptured with narrow, spiral cords; inner lip with a thick callus and one posterior, elongated tooth; outer lip smooth within. Length of decollate shell 44, width 16 mm.

This species is like *C. microlineatum* in size but distinguished by its broader form and convex whorls carinated by the main row of tubercles. It has somewhat the aspect of *C. atratum* living on the Monte Cristi beach.

Our shell is named in honor of Hon. W. W. Russell, M. P., E. E., American Ambassador at Santo Domingo City, as a slight recognition of his very kind interest in our expedition.

Locality.—(Exp'd'16) Zone D, Rio Gurabo at Los Quemados.

Cerithium uniseriale Sowerby

Plate 21, Figures 14, 15

Cerithium uniseriale Sowerby, Quart. Jour, Geol. Soc. London, vol. 6, p. 51, 1849.

Cerithium obesum Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 237, 1873.

Not *Cerithium uniseriale* Gabb, *Id.* p. 237. 1873.

Cerithium uniseriale Guppy, Quart. Jour. Geol. Soc, London, vol. 32, p. 519, pl. 29, fig. 4, 1876. (Figure of Sowerby's type).

The true *C. uniseriale* Sowerby, based on Guppy's figure of the type, can always be recognized by its short, broad form, sudden ascent of the body whorl near the aperture, and tuberculated whorls. It has also been found at Cumana.

Localities. — (Exp'd '16) Zones B and D, Rio Gurabo at Los Quemados; Bluff 2, Cercado de Mao.

Cerithium obesum Guppy

Plate 21, Figure 16

Cerithium obesum Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 237, 1873.

Cerithium obesum Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 519, pl. 29, fig. 9, 1876.

Gabb's *C. obesum* included *C. uniseriale* Sowerby (not Gabb) and *obesum* Gabb. The species is here limited to Guppy's restricted sense.

Cerithium gurabense, n. sp.

Plate 22, Figures 4, 5

Cerithium uniseriale Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 237, 1873.

Not *Cerithium uniseriale* Sowerby, Quart. Jour. Geol. Soc., vol. 6, p. 51, 1849.

Shell slender, high-spired; whorls ten, the first two smooth, nuclear, following whorls with fine, granular, somewhat interrupted spirals, and a row, sometimes doubled, of small pustules beneath the suture; aperture narrowly ovate; inner lip with a thick callus terminating in an elongated, posterior tooth. Length 18, width 7 mm.

Locality- — (Exp'd '16) Zone D, Rio Gurabo at Los Quemados.

Cerithium turriculum? Gabb

Plate 22, Figure 6

Cerithium terriculum Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 238, 1873.

We have an unlabelled specimen sent by Gabb which judging from his description is the unfigured *C. turriculum.*

Cerithium dominicense Gabb

Plate 22, Figure 7

Cerithium dominicense Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 238, 1873.

Our shells appear to be Gabb's unfigured *C. dominicense.*

Locality.— (Exp'd '16) Zone D (Abundant), Rio Gurabo at Los Quemados.

Genus BITTIUM (Leach) Gray

Bittium asperoides Gabb

Plate 21, Figure 17

Bittium asperoides Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 239, 1873.

We have a number of Gabb's metatypes of this unfigured species and collected ourselves approximately eleven hundred shells of all sizes ranging from 1.5 to 5.5 mm. The smaller agree with the metatypes, which are 2-3 mm. long.

I have vainly tried to separate out the larger which intergrade and show no constant differences. They often have varices The Floridian analogue is *B. boiplex* Dall, and the related Gatun shell is *B. Scotti* B. and Pils. The Dominican species has not been found elsewhere.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (Extremely abundant).

Bittium canaliculatum Gabb

Plate 21, Figure 18

Bittium canaliculatum Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 239, 1873.

Our metatypes from Gabb show considerable variation, but one is obviously identical with our specimens. This species has not heretofore been figured. We found it a comparatively rare shell.

Locality.— (Exp'd '16) Bluff 3, Cercado de Mao.

Genus POTAMIDES Brongniart

Potamides dentilabrum Gabb

Cerithium dentilabrum Gabb, Trans. Amer. Phil. Soc., vol. 15. p. 237, 1873.

We have an imperfect metatype from Gabb of this interesting, unfigured shell. The biplicate columella and dentate outer lip seem to place it in the sub-genus *Terebralia* Swainson, now found in Borneo.

Potamides Ormei, n. sp.

Plate 22, Figure 8

Shell rather large, solid; whorls flattened, coarsely cancellated by the intersection of many close-set, longitudinal ribs, crossed by three thick, flat, spiral cords and cut by the three grooves alternating with the cords, thus forming a tripartite series of quadrangular beads to each whorl; the uppermost cord and groove are the strongest and deepest; columella not plicate, body whorl ascending slightly and much thickened near the aperture. Lengte of imperfect specimen 30, greatest width 15 mm. Collected by Gabb in Santo Domingo.

This species is named in honor of Mr. and Mrs. Norman Orme, La Receptoria, Puerto Plata.

Genus SERPULORBIS Sassi

Serpulorbis granifera Say

Plate 22, Figure 9

Serpula granifera Say, Jour. Acad. Nat. Sci. Phila., 1st ser. vol. 4, p. 154, pl. 8, fig. 4, 1824. Reprint Bull. Amer. Paleont. No. 5, 1896.

Vermetus decussatus Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 240, 1873. Not *V. decussatus* Gmelin.

Serpulorbis granifera Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 2, p. 303, 1892.

Anguinella virginiana Whitfield, Mon. 24 U. S. Geol. Survey, p. 132, pl. 24, figs. 1-5, 1894.

Vermetus graniferus Martin, Maryland Geol. Survey, Miocene, p. 232, pl. 54, figs. 14, 15, 1904.

Our Dominican specimens are very like *S. granifera tenera* Dall from the Upper Miocene of North Carolina. They are not identical with the recent Antillean species, *S. decussatus* Gmelin.

Localities.—(Exp' '16) Rio Cana, Guayubin to Mao road; Zone B, Rio Garabo at Los Quemados.

Serpulorbis papulosa Guppy

Plate 22, Figure 10

Vermetus papulosus Guppy, Quart. Jour. Geol. Soc., vol. 22, p. 292, pl. 17, fig. 3, 1866.

Petaloconchus sculpturatus Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 241, 1873.

Vermetus papulosus Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 519, 1876.

Serpulorbis papulosus Dall, Trans. Wagner Inst., vol. 3, pt. 6, p. 1585, 1903.

Guppy described a slender tip from Bowden. His figure is very misleading, but he describes the characteristic rows of tubercles interlined with crenate striæ. Our party found this species in place up to eighteen inches in length but too fragile to secure entire.

Localities. — (Exp'd '16) Rio Cana, Guayubin to Mao road (very fine); Zone F, Rio Gurabo at Los Quemados.

Genus PETALOCONCHUS Lea

Petaloconchus domingensis Sowerby

Plate 22, Figure 11,

Petaloconchus domingensis Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 51, pl. 10, fig. 8, a, b, c, 1849.

Petaloconchus sculpturatus Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 240, 1873. Not *sculpturatus* Lea.

Petaloconchus sculpturatus Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 519, 1876.

Vermetus (*Petaloconchus*) *sculpturatus* Dall (in part), Trans. Wagner Inst., vol. 3, pt. 2, pp. 305, 306, 1892.

Petaloconchus domingensis Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., p. 359, 1911.

Petaloconchus domingensis typically coils in a widening cylinder, with whorls much flattened on the sides and angulate at the base. *P. sculpturatus* coils in a tapering cone, with whorls less flattened and more convex at the base. *P. domingensis* occurs at Bowden; Trinidad (Caroni Series); and Gatun.

Localities. — (Exp'd '16) Zone B, Rio Gurabo at Los Quemados; Bluff 1, Cercado de Mao.

Petaloconchus Laddfranklinæ, n. sp.

Plate 22, Figure 12

Shell delicate, slender, gracefully spirally undulating. Surface regularly and elegantly ornamented with many close, equidistant, longitudinal beaded cords which conform to the spira undulations of the tube. The intervals between the cords are about equal in width to the cords and are smooth except for very fine transverse striæ. At one end two septa are visible within the tube, which indicates that the shell belongs to Lea's *Petaloconchus*. Diameter of tube 2, length 30 mm.

Named in honor of Mrs. Christine Ladd-Franklin.

Locality. — (Exp'd '16) Zone E, Rio Gurabo at Los Quemados. (Rare).

Genus SILIQUARIA Lamarck

Siliquaria gurabensis, n. sp.

Plate 22, Figure 13

Shell small, irregularly spirally convoluted. Apex blunt, convex; whorls nearly smooth, marked only by microscopic transverse growth-lines and by a few, faint, nearly obsolete longitudinal striations. Fissure narrow, in the early whorls represented by a series of minute perforations, in the later whorls these pores are entirely closed over, the margin of the slit being irregularly crenulate. Greatest diameter of tube 2.5 mm.

This genus has never before been reported from Santo Domingo. It is very rare in the American Tertiaries.

Locality. — (Exp'd '16) Zone D, Rio Gurabo at Los Quemados.

Genus TURRITELLA Lamarck

Plate 22, Figure 14

Turritella planigyrata Guppy, Proc. Scient. Assoc. Trinidad, p. 169, 1867.

Turritella planigyrata Guppy, Geol. Mag. London, p. 408, pl. 18, fig. 5, 1874. (Very poor figure).

Turritella planigyrata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 240, 1873.

Turritella planigyrata Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 519, 1876.

Our shells seem identical with Guppy's type from the Caroni Series, Trinidad. The Gatun analogue is *T. gatunensis* Conrad.

which has much more deeply excavated whorls.

Locality. — (Exp'd '16) Bluff 2, Cercado de Mao.

Turritella tornata Guppy

Plate 22, Figure 15

Turritella tornata Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 580, pl. 26, fig. 12, 1866.

Turritella tornata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 240. 1873.

Turritella tornata Dall, Trans. Wagner Inst., vol. 3, pt. 2, p. 312 ,1892; *Id*. pt. 6, p. 1585, 1903.

Turritella tornata Brown and Pilsbry, Proc. Acad. Nat. Sci., Phila., p. 359, 1911.

The beads on our specimens are not so large as on the type from Cumana; but the description otherwise fits exactly. *T. tornata* is of the same group as Conrad's *T. altilira* from Gatun and Heilprin's *T. perattenuata* from the Florida Pliocene, but both these species are very much larger with coarser, bolder sculpture.

Localities. — (Exp'd '16) Zones D and E, Rio Gurabo at Los Quemados.

Turritella submortoni, n. sp.

Plate 22, Figure 16

Shell turreted, the whorls increasing rapidly, excavated above the suture and sharply carinated at their anterior fourth by a ridged spiral thread, posterior to this carina are five or six less prominent spirals and anterior to it are two, making about eight in all. Some or all of the spirals are microscopically beaded. Length of incomplete shell 25, greatest width 9 mm.

Some of the later Lignitic and early Claiborne specimens of *T. Mortoni* resemble this species. One set collected by Professor Harris in Newcastle, Virginia, are strikingly like in surface markings and general aspect.

The Gatun analogue of the Dominican species is *T. mimetes* Brown and Pilsbry.

Localities. — (Exp'd '16) Zones D add E, Rio Gurabo at Los Quemados.

Genus SOLARIUM Lamarck

Solarium quadriseriatum Sowerby

Plate 23, Figures 1, 2

Solarium quadriseriatum Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 51, pl. 10, fig 8 a, b, c, 1849.

Solarium quadriseriatum Guppy, Quart. Jour. Geol. Soc., vol. 22, p. 291, 1866.

Architectonica quadriseriata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 228, 1873.

Solarium quadriseriatum Guppy, Geol. Mag. London. p. 438, 1874.

Solarium granulatum Dall (in part) Trans. Wagner Inst. Sci., vol. 3, pt. 2, p. 392, 1892. Not *S. granulatum* Lamarck.

Solarium quadriseriatum Dall, Trans. Wagner Inst., vol. 3, pt. 6, p. 1585, 1903.

This pretty species is not uncommon in Santo Domingo and occurs at Bowden, Anguilla and the Caroni series of Trinidad.

Localities.—(Exp'd '16) Bluffs 1 and 3, Cercado de Mao; Zone A and B, Rio Gurabo at Los Quemados.

Solarium granulatum Lamarck

Plate 23, Figure 3,

Solarium granulatum Lamarck, An. sans Vert., vol. 7, p. 3, 1822; Ency. Method, pl. 446, fig. 5 a-b, 1792.

Architectonica perspectiva Tuomey and Holmes, Pleioc. Foss. S. Car., p. 120, pl. 26, fig. 6, 1857. Not. *S. perspectiva* Linné nor Lamarck.

Solarium granulatum Dall (in part) Trans. Wagner Inst. Sci., vol. 3, p. 2, p. 329, 1892.

Solarium gatunensis Toula, Jahrb. der K.—K. Geol. Reichsanst. Wien, vol. 58, p. 693, pl. 15, fig. 3, 1908.

Our shell almost exactly matches a specimen of *S. granulatum* from Alum Bluff, Florida, and is so like Toula's *S. gatunensis* that it seems also identical with the Gatun form. *S. granulatum* ranges from the Oligocene to the recent. It is living in the Antilles.

Locality.—(Exp'd '16) Zone I, Rio Cana at Caimito.

Solarium Stonemanæ

Plate 23, Figures 4, 5

Shell conic, depressed, whorls six, handsomely ornamented with oblique, radiating plications often divaricating, cut just above the suture by a single impressed spiral line, thus forming a revolving row of fine beads beneath which, on the periphery of the last whorl, are three more beaded spirals, progressively finer, all three extending into the aperture; perpihery rounded; under surface sculptured with radiating, divaricating plications similar to those on the upper surface; the shell is so deeply perforated that one can look through to the apical volution; marginal teeth small, numerous. Greatest diameter 15, height 9 mm. This species has a slight general resemblance to Conrad's *S. trilineatum*.

This rare and exquisite shell is named in honor of Dr. Bertha Stoneman, Huguenot College, University of the Cape of Good Hope.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Genus RISSOINA d'Orbigny

Rissoina crassilabris Gabb

Plate 21, Figure 19

Eulima crassilabris Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 227, 1873.

Cf. *Eulima crassilabris* Gabb, Jour. Acad. Nat. Sci. Phila., vol. 8, sec. ser., p. 358, pl. 46, fig. 43, 1874—1881. (Pliocene Moen shell).

The thickened outer lip seems so characteristic of *Rissoina* that the species is here referred to that genus.

Localities.—(Exp'd '16) Bluff 3, (Abundant), Bluff 2, (Rare), Cercado de Mao.

Rissoina Sagraiana d'Orbigny

Plate 21, Figure 20

Rissoina Sagraiana d'Orbigny, Hist. Nat. y Pol. Isla de Cuba, vol. 5, p, 162, 1845; *R. Sagra* in Atlas 8, Mollusca, pl. 12, figs. 4, 5, 1855.

Rissoina Sagraiana Dall, Bull. 37 U. S. Nat. Mus., p. 150, 1889.

Rissoina Sagraiana Guppy and Dall, Proc. U. S. Nat. Mus. No. 1110, vol. 19, p. 322, 1896.

Rissoina Sagraiana Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1585, 1903.

This species is referable to the section *Phosinella* Moerch. The shell was first described from the recent fauna of Cuba. It has been found at Bowden, but not heretofore in the Dominican blue clays.

It may here be noted that Gabb's genus *Iopsis* was founded according to Guppy and Dall on a young *Rissoina* and is invalid. Gabb's unfigured *Cerithidea minuta* seems to be also a *Rissoina*.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (About 50 specimens). Bluff 2 (Comparatively rare.)

Genus CRUCIBULUM Schumacher

Crucibulum (*Dispotæa*) cf. *pileolum*

Plate 23, Figure 6

We collected twenty-five specimens of a *Crucibulum* apparently closer to the young of *C. pileolum* than to any other species. Our shells are usually entirely smooth, but a few show the irregular undulations characteristic of the adult *pileolum*. They are not *C. spinosum* with which Gabb identified his Dominican specimens. They may be a new species.

Localities.—(Exp'd '16) Bluffs 2 and 3, Cercado de Mao.

Genus XENOPHORA Fischer de Waldheim

Xenophora conchyliophora Born

Trochus conchyliophorus Born, Mus. Cæs. Ind., p. 333, 1778.

Trochus agglutinans Lamarck, Anim. sans Vert. 7, 14.

Phorus agglutinans Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 241, 1873.

Xenophora conchyliophora Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 2, pp. 360-362, 1892: Bull. 90, U. S. Nat. Mus., p. 105, pl. 15, figs. 1, 3, 1915.

We secured a quantity of these shells on the beach at Monte Cristi identical with the fossils from the blue clays.

Localities.— (Exp'd '16) Zone E and F, Rio Gurabo at Los Quemados.

Xenophora delecta, Guppy

Plate 23, Figures 8, 9

Phorus delectus Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 529, 1876.
Xenophora dilecta Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1585.

This shell is easily distinguished from *X. conchyliophora* by its strikingly ridged upper surface and rows of granules on the under surface. Guppy's type was one of Heneken's Dominican shells, but it also occurs at Bowden.

Localities.—(Exp'd '16) Bluff 1, Cercado de Mao; Zone F, Rio Gurabo.

Xenophora (*Turgurium*) *imperforata* Gabb

Onustus imperforatus Gabb, Trans. Amer. Phil. Soc,, vol. 15, p. 241, 1873.

This shell can be immediately recognized by the prolongation of the periphery into the blade-like flange characteristic of *Turgurium*. On comparing it with the recent Antillean *T. caribæ* Petit, of which we have a metatype from Petit, the fossil is seen to be broader, flatter and more coarsely striate.

Locality.—(Exp'd '16) Zone F, Rio Gurabo at Los Quemados.

Genus NATICA Scopoli

Natica canrena (Linné) Moerch

Plate 23, Figure 10

Nerita canrena (Linné in part) Auct., Mörch, Malak. Blatt. 24, p. 62, 1877.
Natica canrena Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 223, 1873.
Natica canrena Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 518, 1876.
Natica canrena Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 2, p. 364-365, 1892.
Natica canrena Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., p. 508, 1912.

Shell easily distinguished by the characteristic tangential plicæ adjoining the suture. It is a widespread and ancient species, ranging from the Oligocene to the recent, found in Florida, North Carolina, Costa Rica, Trinidad and at Gatun. It is living in the Antilles and south to Pernambuco.

Localities.— (Exp'd '16) Bluff 1, Cercado de Mao; Zone I, Rio Cana; Sandy clays, Rio Cana.

Natica Youngi n. sp.

Plate 23, Figures 11, 12

Shell subglobular, with five rounded whorls; suture well-defined; surface smooth except for growth-lines; aperture semilunar; posterior callus of inner lip thickest at the angle of the aperture; umbilical callus coiled on the umbilical wall near the base, leaving the upper part of the umbilicus entirely open. Various specimens give the following heights and widths: 23×22, 17×16, 22×21 mm.

This species resembles the Jacksonian Eocene, *N. permunda* Conrad, and to a less degree, the Chipolan Oligocene *N. alticallosa* Dall. But the former has the callus coiled on the middle of the wall, and the latter at the upper end, while our shell has it coiled near the base. Doubtless *N. permunda* is the precursor of the Dominican shell.

This species is named in honor of Professor Young, South African College, Cape Town.

Localities.—(Exp'd '16) Zones A, B, E, F, G, Rio Gurabo at Los Quemados; Bluffs 1, 2, Cercado de Rio Mao; Zone I, Rio Cana at Caimito.

Natica (*Stigmaulax*) *sulcata* Born

Plate 23, Figure 13

Natica sulcata Born, Mus. Cæs. Vindobonensis, pl. 17, figs. 5, 6.

Natica sulcata Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 290, pl. 18, figs. 14, 15, 1866.

Natica sulcata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 233, 1873.

Natica sulcata Guppy, Geol. Mag. London, p. 437, 1874; Quart. Jour. Geol. Soc., vol, 32, p. 518, 1876.

Natica (*Stigmaulax*) *sulcata* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 2, p. 366, 1892; *Id.* pt. 6, p. 1585, 1903.

This handsome grooved species attained a large size and is abundant in the blue clays. It has been found at Bowden and Cumana and is still living in the Antilles.

Localities—(Exp'd '16) Bluffs 2, 3, (Very abundant) Cercado de Mao; Rio Cana, Gravels; Rio Cana, Sandy clays; Zones H and I, Rio Cano at Caimito; Zones E and G, Rio Gurabo at Los Quemados.

Genus POLINICES Montfort

Polinices subclausa Sowerby

Plate 23, Figure 14

Natica subclausa Sowerby, Quart. Jour, Geol. Soc. London, vol. 6, p. 51, 1849.

Natica subclausa Guppy, Quart. Jour. Geol. Soc., vol. 22, p. 290, pl. 18, fig. 8, 1866.

Mammilla mamillaris Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 223, 1873. Not *P. mammillaris* Lamarck.

Natica subclausa Guppy, Geol. Mag. London, p. 437, 1874; Quart. Jour. Geol. Soc., vol. 32, p. 519, 1876.

Polynices subclausa Dall, Trans. Wagner Inst. Sci., vol 3, pt. 6, p. 1585, 1903.

Polinices subclausa Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., p 360, 1911.

We collected shells of *P. mammillaris* Lamarck on the Monte Cristi beach. They are much larger than the fossils and light orange brown, not striped. Some of the fossils retain their color pattern of gray stripes on a white background. These differences indicate that Sowerby's species is distinct from the recent analogue.

P. suclausa has been found at Bowden and Gatun and is abundant in Santo Domingo.

Localities.—(Exp'd '16) Zones H and I, Rio Cana at Caimito; Gravels and sandy clays of Rio Cana; Bluffs 2 and 3, Cercado de Mao: Zones D and E, Rio Gurabo at Los Quemados.

Polinices Stanislas-Meunieri

Plate 23, Figures 15, 16

Shell ovate, with five and a half rounded whorls; spire conic; entire surface smooth except for growth-lines; body whorl very slightly concave in front of the suture, elsewhere evenly rounded, aperture semi-circular; inner lip with a thick posterior callus extending without interruption half of the distance from the angle of the aperture to the base, and concealing the upper part of the perforation; the callus is then reduced to half its width by a rectangular truncation. Altitude 36, width 28 mm.

It is with the greatest pleasure that I name this shell in honor of Monsieur Stanislans-Meunier of Paris, as a token of highest esteem and friendship, and a souvenir of his charming *expéditions géologiques*.

Locality.—(Exp'd '16) Rio Cana, Cerro Gordo to Mao road (Guayubin to Mao telephone line).

Subgenus NEVERITA Risso

Neverita nereidis, n. sp.

Plate 23, Figures 17, 18

Shell greatly flattened, smooth except for fine arcuate growth-lines which are strongest on the under surface; whorls five, the first two minute, conical, subsequent volutions flattened above, concavely excavated beneath; umbilicus partly overhung by a tongue-like callus capping the pillar-like umbilical callus which enters and stops up the perforation; aperture large; outer lip slightly sinuous beneath the periphery; the under surface and interior of some specimens show traces of an original chestnut color. Diameter of largest shell 36, altitude 12 mm.

The nearest ally of this fine shell is Humboldt's larger species, *N. glauca*, living from Acapulco to Panama.

Localities. — (Exp'd '16) Zones H and I, Rio Cana at Caimito (The most characteristic fossil of the upper Cana).

Genus AMAUROPSIS Moerch

Amauropsis Guppyi Gabb

Plate 23, Figure 19

Natica phasianelloides Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 17, fig. 1, 1866. Not *N. Phasianelloides* d'Orbigny, De la Sagra, Hist. Pol. y Nat. Isla de Cuba, Atlas 8, Palæont, Tab. 1, fig. 7.

Amaura Guppyi Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 224, 1873.

Natica phasianelloides Guppy, Quart. Jour. Geol. Soc., London, vol.

32, p. 519, 1876.
Ampullina Guppyi Dall, Trans. Wagner Inst., Sci., vol. 3, pt. 6, p, 1585, 1903.

Closely allied to the Eocene *A. jacksonensis* Harris and to the Gatun *Lupia perovata* Conrad. *A. Guppyi* occurs in Anguilla, the San Fernando beds of Trinidad, and those of Bowden. The genus is now limited to the Arctic seas.

Localities.—(Exp'd '16) Bluffs 1 and 2, Cercado de Mao; Zones H and I, Rio Cana at Caimito; Rio Cana gravels; Zone G, Rio Gurabo at Los Quemados.

Amauropsis Guppyi variety *gurabensis*, n. var.

Plate 23, Figure 20

Shell imperforate, with a short, sharp spire and ventricose body whorl; suture impressed; whorls eight, very markedly flattened in front of the suture giving a decidedly shouldered aspect; aperture very large. Length 35.5, of spire 11.5, of aperture 24 mm. Extreme forms are very unlike typical shells of *A. Guppyi* but intergrade. The nearest ally is the smaller *A. floridana* Dall from the Tampa silex bed.

Locality.—(Exp'd '16) Zone G, Rio Gurabo at Los Quemados.

Genus SINUM Bolten

Sinum gatunense Toula

Plate 24, Figure 2

Sigaretus (*Lupia Conrad*) *gatunensis* Toula, Jahrb. der K—K Geol. Reichsanstalt Wien, vol. 58, p. 697, pl. 28, fig. 3, 1908.

Our shells agree so well with Toula's figure and description of *S. gatunense* that they seem identical. They are also closely related to the recent *S. perspectivum*. Guppy's *excentricum* seems about intermediate between this and the following species and differs from both in ornamentation.

Localities.—(Exp'd'16) Zone G, Rio Gurabo at Los Quemados; Bluff 3, Cercado de Mao.

Sinum Nolani, n. sp.

Plate 24, Figure 1

Shell convex, almost imperforate, translucent yet fairly substantial; spire low, whorls four, the earlier smooth, later volutions so very faintly striated as in some lights to appear smooth, but under a lens their surface is seen to be covered with excessively fine, wavy, spiral threads; aperture large, the spreading outer lip joining the body above the periphery of the preceding whorl; inner lip somewhat thickened; there is a mere chink or suggestion of a perforation. Greatest diameter 19, of aperture 11 mm.

In general outline, convexity and appearance of the spire this shell resembles the larger, recent Oriental species, *S. lævigatum* Recluz, but our fossil is even less faintly striated than that shell. The Floridian fossil analogue is *S. chipolanum* Dall. *S. Gabbi* Pilsbry and Brown seems to be a pigmy relative, but the perforation is relatively much larger.

I take great pleasure in naming this rare shell in honor of Dr. Edward J. Nolan, of the Academy of Natural Science, Philadelphia.

Locality.—(Exp'd '16) Zone E, Rio Gurabo.

D. SUPER-FAMILY PTENOGLOSSA

Genus EPITOMIUM Bolten

Epitomium minutissimum Gabb

Plate 24, Figure 3

Scalaria minutissima Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 224, 1873.

Distinguished by its slender form and blade-like lamellæ toothed at the shoulders of the whorls. Our shells answer well to Gabb's description of this unfigured species.

Localities.—(Exp'd '16) Bluff 3, Cercado de Mao (Rare).

Epitomium riparum, n. sp.

Plate 24, Figure 4

Shell with convex whorls, adorned by many low lamellæ, their edges curled laterally so as to appear from above rounded and slightly flattened, lamellæ numbering about nineteen on the last whorl; under the microscope the spirals in the interspaces appear as raised flat threads, a little stronger than in *E. minutissimum;* each whorl usually also has a single heavy, rounded opaque white varix which on the body whorl marks the termination of the outer lip, but one shell has two additional varices on the last whorl, all three being on the latter third of the volution; all the sculpture extends to the base of the shell, aperture round, lip thickened, continuous. An incomplete shell of six whorls measures 7 × 3 mm. The style of sculpture resembles that of the recent *E. gracilentum* Gould. Our shell can be recognized by its many low lamellæ, fine spirals and rounded white varices.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Epitomium cercadicum, n. sp.

Plate 24, Figure 5

Shell rather broadly conic; apex lost, remaining whorls six, convex, adorned with blade-like lamellæ, thirteen on the last whorl, which are not denticulate at the shoulder nor hooked at the suture, but simple and continuous or subcontinuous, from whorl to whorl; the lamellæ appear to be made up of a single sheet each; spirals nearly obsolete, exceedingly faint even under strong magnification; the interspaces shining and polished; suture deep; aperture rounded; lip thickened, the thickening interrupted at its contact with the body whorl. Length of decollate shell 6.25, greatest width 3 mm.

The broader basal whorl, more rapidly tapering spire, and blade-like, subcontinuous, simple, not toothed lamellæ differentiate this species.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (Rare).

Epitomium textuvestitum, n. sp.

Plate 24, Figure 6

Shell extremely long and slender; suture constricted, somewhat obscure; whorls twelve to thirteen, the first three smooth, nuclear; post-nuclear whorls convex, ornamented with many, close-set, undulating, longitudinal ribs (fourteen on the last whorl) which on the later volutions usually either do not quite extend to the upper (posterior) suture, or else are suddenly bent to the left and diminished on approaching it; the entire surface of the shell, excepting only the protoconch, exhibits under the lens a most curious texture which might be likened to a woven cloth in which the woof (representing the spirals) is somewhat coarser than the warp; there is one heavy, rounded varix to each volution, that of the last whorl bordering the lip, but those of the preceding whorls forming a more or less continuous line ascending obliquely up the shell; aperture small, ovate; lip bordered by a very thick, minutely crenulated, platform-like varix sunken a trifle below the level of the lip. Length 16, width 4.75 mm.

This curious species is characterized by its singular texture and extraordinary lip recalling that of *Cirsotrema* Moerch, but the shell is not cancellate as in that section. A species slightly resembling our fossil was dredged by the *Blake* in 100 fms. off Barbados and described by Dall as *Scala hellenica* var. *Moerchiana*.

Locality. — (Exp'd '16) Zone E, Rio Gurabo, at Los Quemados (Rare).

Genus ACLIS Lovén

Aclis acuminatoides, n. sp.

Plate 24, Figure 7

Shell minute, polished and shining, apex broken, remaining whorls seven and a half, slightly convex especially anteriorly, entirely smooth and without ornament; suture distinct, linear, not channeled. Length of shell 3.6, greatest diameter .75 mm.

This species is named from its resemblance to the Jamaican *Aclis acuminata* Guppy but that is characterized by its overhanging whorls, while ours only widen very slightly anteriorly, are more closely coiled, flatter, and not so constricted at the suture. Evidently our shell is distinct from the unfigured *A. polita* since Gabb emphasizes its channeled suture not present in ours.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao.

E. SUPER-FAMILY GYMNOGLOSSA

Genus MELANELLA Bowdich

Melanella (*Eulima*) *cercadica*, n. sp

Plate 25, Figure 1,

Eulima acicularis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 227, 1873.

Not *Eulima acicularis* A. Adams, Ann. and Mag. Nat. Hist., p. 125, 1861.

As Gabb's name was preoccupied by Adams, a new name is needed and *cercadica* seems appropriate. Gabb's species *robusta* was also preoccupied by Adams in 1861.

M. cercadica resembles the recent *bifasciata* d'Orb. (*acuta* Sowerby) but the latter is not constricted at the suture, is smaller, and has a spiral line of color, whereas our shells show traces of a band of fulvous yellow in the constricting zones.

Locality—(Exp'd '16) Bluff 3, Cercado de Mao.

Melanella (*Eulima*) *maoïca*, n. sp.

Plate 25, Figure 2

Shell small, moderately slender, solid, polished; whorls eleven, the apical large, knobbed, the second convex, projecting; subsequent whorls straight, their width two and a third times their axial height; suture distinct, slightly overhanging the following whorl; aperture small, outer lip thin, a little inflated, oblique, arcuate, slightly produced anteriorly. Length of shell 4.10, of body whorl 1.50, of aperture .90, greatest diameter 1.10 mm. The most characteristic feature of this species is its large knobbed nucleus.

Locality—(Exp'd '16) Bluff 3, Cercado de Mao.

Melanella (*Eulima*) *jacululum*, n. sp.

Plate 25, Figure 3

Shell small, slender, solid, porcellanous; whorls about twelve, their width nearly twice their height, their sides flattened, somewhat overhanging the following volutions; suture distinct, transverse; base of body whorl rounded; aperture small; outer lip thin, arcuate, slightly produced anteriorly; the shell shows traces of a rosy band near the suture. Length of shell 4.25, of body whorl 1.50, of aperture .70; greatest width 1.25 mm. This species is characterized by its overhanging whorls.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao.

Melanella (*Eulima*) *Tethyos*, n. sp.

Plate 25, Figure 4

Shell small, slender, surface entirely smooth, whorls about twelve, their sides straight, their axial height being equal to one-half their width; suture distinct, transverse; base of body-whorl rounded; aperture small; outer lip simple, slightly oblique, arcuate, hardly produced anteriorly; inner lip with a small callus, wider on the columella. Length of shell 6.60, of body whorl 1.25, of aperture 2.25; diameter 1.85 mm.

Locality.— (Exp'd '16) Bluff 3, Cercado de Mao.

Genus NISO Risso

Niso grandis Gabb

Plate 24, Figure 8

Niso grandis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 227, 1873.
Niso grandis Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1584, 1903.

Gabb's shell was unusually large with a diameter of 13 mm. As none of ours attained this size I felt some doubt of their identity with Gabb's and asked Dr. Dall's opinion. He pronounced our shell *N. grandis.*

Localities.—(Exp'd '16) Zone I, Rio Cana at Caimito; Bluff 3, Cercado de Mao;

Genus PYRAMIDELLA Lamarck

Pyramidella canaliculata Gabb

Plate 25, Figure 5

Obeliscus canaliculatus Gabb, (in part) Trans. Amer. Phil. Soc., vol. 15, p. 225, 1873.

Obeliscus canaliculatus Dall, Trans. Wagner Inst. Sci., vol 3, pt. 2, p. 247, 1892.

Gabb's description of *O. canaliculatus* comprises a number of different forms, some of which we also collected. Dr. Dall's remark concerning the type corresponds. He says, (Trans. Wagner Inst. Sci., vol. 3, pt. 2, p. 247, 1892) "The supposed types at Philadelphia comprise three or four species belonging to several distinct genera, all loose in one tray together." I have here restricted the species *canaliculata* to the following form, chosen from its possessing the more striking of the characters enumerated by Gabb.

Shell elongate-conic, slender, nuclear whorls two, subsequent whorls thirteen, flattened, shouldered at the summit which is minutely crenulated; suture deeply channeled, the center of the channel being occupied by a fine sutural thread; periphery of last whorl sulcate; base rounded; perforation minute, surrounded by a stout fasciole; aperture oval; columella slender, with one transverse, lamellar, posterior plication and two oblique folds below, the anterior of which borders the canal; outer lip thin, with two or three denticles, a varying distance within. Length 11, diameter 4 mm. This species somewhat resembles the recent *P. panamensis* Bartsch, dredged off Panama.

Sowerby described as *canaliculatus* an entirely different species from the Sandwich Islands (Proc. Zool. Soc., London, for 1873) but apparently this was not published until early in 1874, so that Gabb's name has priority.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Pyramidella semicanaliculatas, n. sp,

Plate 25, Figure 6

Shell resembling *P. canaliculata* but differing markedly in the character of the suture. In *P. canaliculata* the whorls are excavated both *above* and *below* the sutural thread thus forming a double channel in the center of which the sutural thread lies. In this shell the whorls are excavated only *below* the sutural thread so that the channel is single and the sutural thread lies just posterior to it; whorls thirteen; columella tri-plicate; outer lip with several denticles; shell minutely perforate, the perforation bordered by a fasciole. Length 9.5, diameter 3 mm.

This species resembles *P. forulata* Guppy from Bowden; but our fossil is nearly twice as long, and with a much higher spire.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Pyramidella diademata, n. sp.

Plate 25, Figure 7

Shell slender, sub-perforate, resembling *P. semicanaliculata* but the sutural channel is deeper and the summit of the whorls is strongly crenulated, and even the peripheral sulcus on the last whorl is distinctly crenulated on its anterior border; whorls eleven exclusive of the small, helicoid protoconch of about two additional volutions; columella with three folds, the posterior nearly transverse, the two anterior oblique and proximate; outer lip typically with four strong denticles. Length of shell 9.25, greatest diameter 3 mm.

The distinguishing feature in this pretty species is its strongly crenulate subsutural border.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Pyramidella Olssoni, n. sp.

Plate 25, Figure 8

Shell elongate-conic, slender, with fourteen whorls, protoconch helicoid, its axis lying at an angle to the main axis of the shell; post-nuclear whorls flattened, slightly shouldered, very weakly and minutely crenulated at the summit; suture narrowly but rather deeply channeled; periphery of last whorl marked by a fine, distinct revolving rib; base rounded; aperture narrowly oval; columella tri-plicate, the two anterior folds oblique, parallel, the posterior slightly oblique; outer lip typically with three denticles within, the stronger posterior; basal fasciole present; shell scarcely, if at all, perforate. Length 10, diameter 3 mm.

This species is distinguishable by the presence of the fine revolving rib on the periphery of the last whorl, which takes the place of the sulcus in *P. canaliculata* and *semicanaliculata*.

The shell is dedicated to Mr. Axel Olsson by whom it was found.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Pyramidella (*Callolongchæus*) *cercadensis*, n. sp.

Plate 25, Figure 9

Shell related to *P. jamaicensis* Dall, but slenderer and more rudely sculptured; protoconch small and immersed; post-nuclear whorls eight, convex, not flattened as in *jamaicensis*; periphery of last whorl marked by an incised spiral line or narrow sulcus; the preceding whorls are wound at a distance equal to one-third of the whorl in front of the peripheral sulcus; suture channeled and the anterior border is very minutely crenulated; columella with a large posterior, horizontal fold and two oblique anterior folds, the most anterior being very weak, scarcely discernible; base of body whorl rounded; outer lip with two denticles, the posterior much the larger; surface of shell polished, marked by growth-lines and by very faint spiral striæ. Length of shell 4.25, width 1.40 mm.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao (Rare).

Pyramidella (*Orinella*) *Arionis*

Plate 25, Figure 10

Shell small, slender, short, smooth and porcellanous; suture distinct, whorls seven plus the rather large protoconch; the latter is helicoid and consists of about one and a quarter visible whorls, half immersed; post-nuclear whorls with their sides flattened, somewhat turreted, axial height of each whorl equal to about half its width; aperture small, columella with one large, prominent plication. Length of shell 3.25, of body whorl 1.15, of aperture .50, greatest diameter .75 mm.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Genus TURBONILLA Risso

Turbonilla (*Chemnitzia*) *Ogilviea*, n. sp.

Plate 25, Figure 11

Shell very slender and delicate, whorls twelve to thirteen in addition to the small helicoid protoconch, volutions nearly flat to slightly rounded, ornamented with heavy, nearly straight ribs, slightly curved near the upper suture, and ending very abruptly at the periphery of the body whorl number of ribs on the last three whorls seventeen each; interspaces smooth and polished; suture distinct, bordered posteriorly by a smooth, narrow band; base of shell smooth; columellar fold inconspicuous. Length 6.5, diameter 1 mm.

This little shell belongs to the subgenus *Chemnitzia* d'Orbigny. It is named in honor of Professor Ida H. Ogilvie of Barnard College.

Gabb's unfigured *T. augusta* appears to have been a *Chemnitzia* but is invalid, as Carpenter had used the name nine years before.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Turbonilla (*Chemnitzia*) *yaquensis*, n. sp.

Plate 25, Figure 12

Shell very small and slender, with ten slightly convex whorls ornamented with narrow oblique ribs which extend to the posterior suture and end abruptly at the periphery of the last whorl; interspaces considerably wider than the ribs, smooth and porcellanous; the last three whorls each have about thirteen ribs; suture distinct; columellar fold inconspicuous. Length 3.60, diameter .65 mm.

This shell is distinguished by its small size, slightly convex whorls, and oblique ribs, much narrower than their interspaces.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Turbonilla (*Chemnitzia*) *cercadensis*, n. sp.

Plate 25, Figure 13

Shell very minute, resembling in form and in the number of whorls Guppy's *T. plastica*, but his shell is described as having spiral striæ and is therefore a *Pyrgiscus;* whorls six (in addition to the large helicoid nucleus, flattened on the sides and a trifle narrower below than above, giving a turriculate appearance to the whole shell; ribs straight, seemingly ending at the periphery of the last whorl but actually extending feebly beyond it; ribs broad, those ornamenting the last whorl eighteen, and about the same number are on the two whorls preceding the last; interspaces between the ribs narrower than the ribs, smooth and polished; base of shell smooth. Length 2.5, diameter .60 mm.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao;

Turbonilla (*Strioturbonilla*) *dominicensis* Gabb

Plate 25, Figure 14

Turbonilla Dominicensis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 225, 1873.

Shell small, long and very slender, whorls eleven, very slightly convex, flattened at their centers; suture deep, with the ends of the ribs somewhat projecting, giving the whorls a finely coronate aspect; ribs straight, very slightly oblique, extending only to the periphery of the body whorl or very weakly beyond; number of ribs on the last whorl about sixteen, on the penultimate fourteen and fourteen also on the third whorl from the last; spiral sculpture very fine, delicate, and regular between the ribs, coarser and weaker on the base; inner lip showing no fold, columella twisted. Length 6, diameter .9 mm. Slenderer than *T. ornata* d'Orb. and the ribs do not extend over the base as in that shell.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Turbonilla (*Pyrgiscus*) *Karlschmidti*, n. sp.

Plate 25, Figure 15

Shell slender, with about eleven post-nuclear whorls, slightly convex, ornamented with weak ribs, twenty-eight on the ultimate and twenty-six on the penultimate whorl; ribs wider than the interspaces and extending on the body whorl from the suture to the umbilical region; in the interspaces there are about twenty impressed spiral lines, irregularly spaced and defining unequal bands, on the last whorls these spirals also continue to the umbilical region; aperture oblong-ovate. Length 8, diameter 1.5 mm. This shell resembles the west coast recent *T. castanea* Keep, but the last whorl of the fossil is not inflated. *T. turritissima* Guppy from Bowden differs, among other respects, in its sculpture.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Turbonilla (*Pyrgiscus*) *Olssoni*, n. sp.

Plate 25, Figure 16

Shell resembling and related to *T. Karlschmidti*, but with fewer ribs and the ribs do not extend completely over the base; nucleus planorboid, post-nuclear whorls thirteen, flattened or slightly convex; ribs about equalling in width the interspaces, ultimate whorl with nineteen, penultimate with eighteen ribs; in the interspaces between the ribs and on the base of the shell are numerous, variable spiral threads, near the middle of each whorl three or four of these spirals are more pronounced; aperture quadrate, columella with a fold. Length 9.5, diameter 2 mm.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Turbonilla (*Pyrgiscus*) *turritissima* Guppy

Plate 25, Figure 17

Turbonilla turritissima Guppy, Proc. U. S. Nat. Mus., vol. 19, no. 1110, p. 316, pl, 28, fig. 5, 1896.

Our shells resemble Guppy's figure of the Bowden species and appear identical.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao; Zone H, Rio Cana at Caimito.

Turbonilla (*Pyrgiscus*) *riomaoënsis*, n. sp.

Plate 25, Figure 18

Shell extremely slender with thirteen or fourteen whorls exclusive of the protoconch which is lost, whorls flattened or slightly convex; suture deep, sub-canaliculate; whorls adorned with straight, rather heavy ribs of which there are 16 on the last whorl ending at the periphery; between the sutures in the interstices between the ribs there are eleven incised spiral lines which define regular, even, spiral bands; aperture oval; base of body-whorl gently rounded, columella with a low, broad fold. Length 6.5, diameter .90 mm. Distinguished by its slender form, deep sutures and rather heavy ribs.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Turbonilla (*Visma*) *turritelloides* Gabb

Plate 25, Figure 19

Turbonilla turritelloides Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 226, 1873.

Our shells answer well to Gabb's description of this unfigured species which resembles a miniature *Turritella*. It is a *Visma*.

Locality.—(Exp'd '16)—Bluff 3, Cercado de Mao (Abundant).

Turbonilla (*Mormula*) *Nanniebellæ*, n. sp.

Plate 25, Figure 20

Shell with twelve to fourteen convex whorls adorned with strong ribs and strong, raised spiral lines in the intervals between the ribs; protoconch small, bulimoid, the last half immersed, the apical half projecting laterally and lying at right angles to the main axis of the shell; ribs strong, straight, slightly narrower than their interspaces and ending at the periphery of the last whorl, seventeen on the ultimate and penultimate whorls; the spiral ornamentation consists of incised lines which define broad, flat bands, four to a volution, the three anterior bands being equal, the fourth a little narrower; base of shell smooth or with one or two incised spiral lines near the periphery; aperture round; columellar fold inconspicuous. Length 7.25, diameter 1 mm.

Occasionally a specimen shows a broad varix as represented in the species *T. ambusta* and *T. catalinensis* Dall and Bartsch,—a feature distinguishing *Mormula* from *Pyrgiscus*.

This dainty shell is named in honor of Miss Nannie Belle Maury of Washington.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Genus ODOSTOMIA Fleming

Odostomia Sancti-Dominici, n. sp.

Plate 25, Figure 21

Shell minute, polished, entirely smooth, sub-perforate, rather thin; suture distinct; whorls five, their sides nearly straight, except those of the body whorl which slope convexly to the rounded base; peritome discontinuous, outer lip thin, slightly produced anteriorly; aperture wide; fold of columella prominent. Length of shell 2.5; of body whorl 1.50; of aperture .90; greatest diameter 1.15 mm.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao.

Odostomia yaquica, n. sp.

Plate 25, Figure 22

Shell minute, with about seven whorls more or less flattened except the last which is slightly convex; suture distinct, somewhat channeled by the beveled anterior edge of the volution; base of last whorl rounded; aperture ovate to quadrate; outer lip simple; the single columellar plication large and sharp. Length of shell 3.50, of body whorl 1.75, of aperture 1; greatest diameter 1 mm.

Locality.— (Exp'd '16) Bluff 3, Cercado de Mao.

SUBORDER SCUTIBRANCHIATA

A. SUPER-FAMILY RHIPIDOGLOSSA

Genus Neritina Lamarck

Neritina (Puperita) figulopicta, n. sp.

Plate 24, Figure 10

Shell small, smooth, opaque, white, painted with an open irregularly reticulated design embellished with series of parallel dashes, producing the effect of a design on Indian pottery; spire apparently characteristically eroded; aperture semi-lunar; outer lip thin; inner lip with a heavy, expanded, platform-like callus, finely crenulate on its free edge. Greatest diameter of shell 8, greatest thickness 5 mm.

This shell is probably the ancestor of *N. pupa* Linné living in the West Indies; but differs markedly in the platform-like callus.

Locality.—(Exp'd '16) Gravels of the Rio Cana near Caimito.

Neritina (Smaragdia) viridemaris, n. sp.

Plate 24, Figure 11

Neritina viridis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 242, 1873. Not *N. viridis* Linné.

Shell small, delicate, color pale sea green painted with parallel, black lightning-like flashes, straight and zigzag; form somewhat oblique; spire depressed; suture distinct; whorls three, the last convex, slightly shouldered; aperture wide, produced anteriorly; outer lip thin; inner lip with a thick callus, the free edge of which may be very minutely crenulate. Greatest diameter of shell 8, greatest thickness 3.25 mm.

This attractive shell is the precursor of *N. viridis* living in the West Indies; but the fossil is smaller and its color scheme very different. We collected over a hundred specimens all with the same design, showing it to be quite constant.

Locality.—(Exp'd '16) Bluff 2, (rare); Bluff 3, (abundant), Cercado de Mao.

Genus PHASIANELLA Lamarck

Phasianella punctata Gabb

Plate 24. Figures 12, 13

Lacuna punctata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 240, 1873.

Characterized by microscopic, opaque white spots on a quincunx plan upon a semi-translucent ground.

The genus *Lacuna* is chiefly Arctic in its present distribution. The affinities of the fossil seem rather with *Phasianella tessallata* (living on the Monte Cristi beach), which is spotted and more or less umbilicated. This would harmonize with Gabb's remark, "It is living in the West Indies but I cannot find it described".

Localities.—(Exp'd '16) Bluff 2 (rather rare), Bluff 3 (abundant), Cercado de Mao.

Genus TURBO Linné

Turbo crenulatoides, n. sp.

Plate 24, Figure 14

Cf. *Turbo castaneus* Guppy, Quart. Jour. Geol. Soc., London, vol. 22, p. 291, 1866; Geol. Mag. London, p. 441, 1874.

Cf. *Turbo* near *crenulatus* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1585, 1903.

Shell resembling Kiener's figure of *T. crenulatus* Gmelin (Kiener, Coq. Viv. vol. 9, pl. 27, fig. 1) but the entire ornamentation is formed of squamose plates, crenate or vaulted. Whorls about six, convex anteriorly, flattened posteriorly, the angle on the shoulder being marked by a conspicuous row of vaulted squames of which there are eighteen on the last whorl. Above and below this the whorls are sculptured with crenate spirals, usually alternating in strength and tending to become nodular on the base. Length of largest specimen 30, width 23 mm.

Localities.—(Exp'd '16) Zone B, Rio Gurabo; Zone H, Rio Cana.

Turbo dominicensis variety *Laloi*, n. var.

Plate 24, Figure 15

Shell imperforate with six angulated whorls; on the last are fifteen larger and six smaller revolving, rounded ribs, 21 in all. The most conspicuous is the beaded rib beneath the suture, anterior to it on the last whorl are three other smaller, beaded spirals and among them two very fine beaded threads, all being on the flattened posterior part of the whorl, the ribs elsewhere are not beaded. Length 23, width 18 mm. This shell differs from Gabb's description of his unfigured *T. dominicensis* in the angulated whorls and limited number of beaded spirals.

Localities.—(Exp'd'16) Bluff 2, Cercado de Mao; Zone G, Rio Gurabo at Los Quemados; Zone I, Rio Cana at Caimito.

Genus ASTRALIUM Link

Astralium sublongispinum, n. sp.

Plate 24, Figures 16, 17

Astralium longispinum Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 242, 1873. Not *Trochus longispina* Lamarck.

Shell resembling recent *A. longispinum* but with much finer, more even and oblique sculpture above, and more numerous, finer spirals beneath, the early whorls are not flattened as in the recent shell. The recent species is doubtless the descendant and abounds on the Monte Cristi beach, showing many variations.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (Not rare).

Astralium Karlschmidti, n. sp.

Plate 24, Figure 18

Shell high, trochiform, imperforate, whorls about five, slightly concave, carinated at the periphery which bears about thirteen short, dentate spines. Surface of whorls sculptured with many close-set, very regular, fine, oblique threads, cut by three or four impressed spiral lines near the margins of the whorls. Under surface of shell with very numerous, fine spiral threads crossed by still finer radial striæ. Altitude of largest shell 15, greatest diameter 18 mm.

Localities.—(Exp'd '16)—Bluff 3, Cercado de Mao; Zones H and I, Rio Cana at Caimito.

Genus CALLIOSTOMA Swainson

Calliostoma Grabaui, n. sp.

Plate 24, Figure 19

Shell pyramidal, pearly and iridescent beneath the surface, whorls eight, ornamented with four or five stronger, sharply crenate, spiral threads and among them two or three much finer, beaded lines; whorls slightly convex, excavated a little at the suture so that the sides of the shell do not not form an uninterrupted line from the base to the apex; periphery rounded, base convex, perforate, ornamented with ten narrow, spiral ridges, the wider interstices being strongly sculptured by lines ofgrowth. Altitude 18, diameter 19 mm.

This rare and handsome *Calliostoma* is named in honor of Professor Amadeus Grabau of Columbia University as a token of regard.

Localities.—(Exp'd '16) The Samba Hills, about halfway down the southern slope, on the road from Rompino to Los Caobas; also Zone G, Rio Gurabo at Los Quemados.

Genus VITRINELLA C. B. Adams

Vitrinella (*Circulus*) *striata* Gabb

Plate 24, Figure 23

Cyclostrema striata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 242. 1873.

Our specimens correspond to Gabb's description of this unfigured species, and appear to be identical. We have referred the species to the section *Circulus* Jeffreys as redefined by Miss Bush.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (Common.)

Genus TEINOSTOMA A. Adams

Teinostoma sandomingense, n. sp.

Plate 24, Figure 24

Shell small, orbicular, flattened, smooth and polished, marked only by delicate growth-lines; spire somewhat concealed, periphery convex, very slightly carinate; outer lip sharp; umbilical region covered by a large flat callus; aperture sub-circular; oblique, receding beneath. Diameter 4, altitude 1.54 mm. This species is related to *T. nanum*, from the Maryland Miocene and is also akin to the recent *T. cryptospira* Verrill.

Locality.— (Exp'd '16) Bluff 3, Cercado de Mao. (Very rare.)

Genus DISCOPSIS de Folin

Discopsis Derbyi, n. sp.

Plate 24, Figure 20

Shell minute, spire depressed, whorls four; upper surface very finely, microscopically, spirally striated, and marked at intervals by faint, curved lines of growth, last whorl flanged by a very strong rounded carina revolving around the shell just beneath the periphery; base convex, ornamented with eight very strong, sharp-edged, curved, radial plications; aperture oblique, receding below, sagittate, the outer lip being produced into a very conspicuous point; the cord-like umbilical callus is continuous with the thickening of the margin of the lip and descends into the umbilicus. This species has a general resemblance to the Floridian Pliocene *T. calliglyptum* Dall and to the recent *D. Schumoi* Vanatta from the British Honduras. Greatest diameter 4 mm.

This rare and curiously beautiful shell is named as a tribute to the memory of Dr. Orville A. Derby, lately Director of the Serviço Geologico do Brazil, who for over two score years knew of no sacrifice too great to advance the knowledge of the palæontology of his adopted land.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (A single shell).

Genus FISSURIDEA Swainson

Fissuridea Henekeni, n. sp.

Plate 24, Figure 21

Shell resembling *F. alternata* Say but differing in the ornamentation, the concentric laminæ being raised into hollow vaulted scales and tubes as they cross the radiating ribs. An examination of many specimens of *F. alternata* shows some shells have crenulated scales but none show the hollow tubular structure characteristic of the fossil shell. As in *F. alternata* every fourth rib is stronger; the perforation is in front of the middle of the shell, and is keyhole-shaped; the anterior slope is slightly convex, the posterior slope slightly concave. Length 19, breadth 12, altitude 7 mm.

Dedicated to the memory of Colonel Heneken, who made the first collection of fossils and the first sections of the Tertiary formations of the Rio Yaqui.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito. (A single shell.)

Fissuridea alternata Say

Plate 24, Figure 22

Fissurella alternata Say, Jour. Acad. Nat. Sci. Phila., 1st ser. vol. 2,

p. 224.

Lucapina alternata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 244, 1873.

Our shells are slightly laterally compressed and narrower, but otherwise appear identical with *F. alternata* from the Carolina coast.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao (Not common).

CLASS SCAPHOPODA

Genus DENTALIUM Linné

Dentalium dissimile Guppy

Plate 26, Figure 1

Dentalium dissimile Guppy, Quart. Jour. Geol. Soc., vol. 22, p. 292, pl. 17, fig. 4, 1866.

Cf. *Dentalium dissimile* Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 244, 1873.

Dentalium dissimile Pilsbry and Sharp, Proc. Acad. Nat. Sci. Phila., vol. 49, p. 469, pl. 11, figs. 3, 4, 5, 1897.

Dentalium dissimile Pilsbry, *Idem*,,vol. 63, p. 136, 1911.

Shell with a quadrangular, finely striate apex, becoming smooth, round and shining near the aperture. The type locality is Jamaica.

Localities.—(Exp'd '16) Bluffs 2 and 3, Cercado de Mao; Zone G, Rio Gurabo at Los Quemados.

Dentalium dissimile variety *ponderosum* Gabb

Plate 26, Figure 2

Dentalium ponderosum Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 244, 1873.

Dentalium dissimile var. *ponderosum* Pilsbry and Sharp, Proc. Acad Nat. Sci. Phila., vol. 49, p. 470, pl. 10, figs. 1, 2, 3; pl. 11. figs. 15 16, 1897.

This large, common species often becomes so thickened internally that the cavity becomes a mere perforation.

Localities.—(Exp'd '16) Bluff 2, Cercado de Mao (Very abundant); Zone G, Rio Gurabo at Los Quemados.

Dentalium Cossmannianum Pilsbry and Sharp

Plate 26, Figure 3

Dentalium dissimile variety Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 224, 1873.

Dentalium Cossmannianum Pilsbry and Sharp, Proc. Acad. Nat. Sci. Phila., vol. 49, p. 467, pl, 10, fig. 11; pl. 11, figs. 10, 11, 1897.

This is differentiated from our other Dominican shells of the genus by its six longitudinal ridges. Collected by Gabb in Santo Domingo (C. U. Museum No. 7630).

Dentalium glaucoterrarum, n. sp.

Plate 26, Figure 4

Shell with eight equal, distinct, raised longitudinal ribs, intervals slightly convex, marked by irregularly spaced circular growth lines; interstitial riblets entirely absent or extremely weak. Length of fragment 23, diameter of larger end 4, of smaller 3 mm.

This species resembles *D. Cossmannianum*, but has eight instead of six ribs. Inasmuch as in recent *Dentalia* the number of ribs is an important character of classification and six and eight ribbed forms are referred to different groups, our fossil would appear to a distinct species.

Locality.—(Exp'd '16) Zone E, Rio Gurabo at Los Quemados.

Dentalium haytense Gabb

Dentalium Haytensis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 244, 1873.

Dentalium haytense Pilsbry and Sharp, Proc. Acad. Nat. Sci., Phila· vol. 49, p. 471, pl. 11, figs. 8, 9, 1897.

We have a number of very smooth, shining, tapering *Dentalia* which seem to be this species. No perfect shell has ever yet been found.

Locality.— (Exp'd '16) Bluff 3, Cercado de Mao.

Genus CADULUS Philippi

Cadulus phenax Pilsbry and Sharp

Plate 26, Figure 5

Gadus domingensis Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 245, 1873.

Cadulus phenax Pilsbry and Sharp, Proc. Acad. Nat. Sci. Phila., vol. 49, p. 472, pl. 11, figs. 23, 24, 1897.

We found hundreds of this delicate little shell in the bluffs of the Mao River. *C. dentalinus* is the Bowden analogue.

Localities.—(Exp'd '16) Bluff 2 (comparatively scarce), Bluff 3 (very abundant), Cercado de Mao.

Cadulus elegantissimus Pilsbry and Sharp

Plate 26, Figure 6

Gadus domingensis Gabb (in part), Trans. Amer. Phil, Soc., vol. 15, p, 246, 1873.

Cadulus elegantissimus Pilsbry and Sharp, Proc. Acad. Nat. Sci. Phila., vol. 49, p. 473, pl. 11, figs. 28-30, 1897.

We collected over fifty shells of this species which resembles *C. phenax* but is nearly twice as large. The two occur together in the same bluffs.

Localities.—(Exp'd '16) Bluff 2 (comparatively scarce), Bluff 3, (common), Cercado de Mao; Zone H, Rio Cana at Caimito.

Cadulus denticulus-tigris, n. sp.

Plate 26, Figure 7

Shell small, polished, smooth, shaped precisely like a miniature tiger's canine tooth; greatest diameter sub-central, thence tapering towards either extremity; apex minute circular; aperture somewhat larger, sub-circular. Length of shell 6.25, greatest diameter 1.75 mm.

A very rare species, quite different from any fossil *Cadulus* described from Santo Domingo or Bowden.

Locality.—(Exp'd '16) Zone G, Rio Gurabo at Los Quemados.

CLASS PELECYPODA

ORDER PRIONODESMACEA

Genus NUCULA Lamarck

Nucula tenuisculpta Gabb

Plate 26, Figure 8

Nucula tenuisculpta Gabb, Trans, Amer. Phil. Soc., vol. 15, p. 255, 1873.

Shell oblique, roundly triangular, surface highly polished as though veneered; marked with faint, microscopic radiating lines, inner margin crenulated. Length of largest shell 4, altitude 3 mm. This rather rare species is now figured for the first time.

Locality.— (Exp'd '16) Bluff 3, Cercado de Mao.

Genus LEDA Schumacher

Leda peltella Dall

Plate 26, Figure 9

Leda acuta Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 255, 1873. Not *L. acuta* Conrad 1832, nor Sowerby 1837.

Leda peltella Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 579, pl. 32, fig. 5; pt. 6, p. 1586, 1903.

We collected great numbers of this species, literally thousands of shells, in Bluff 3. Our largest specimens attain the length of 8 mm., given by Gabb and Dall, but the great majority are about 6 mm. We have them, however, of all sizes and ages. The anterior and posterior sulcations shown in Dr. Dall's handsome illustration of the Jamaican shell are sometimes conspicuous, but often hardly apparent in our shells, yet all seem to be the same species and identical with the Bowden form.

Localities.—(Exp'd '16) Bluff 2 (not very common), Bluff 3 (extremely abundant), Cercado de Mao; Zone I (rather scarce), Rio Cana at Caimito; Zone G (rare), Rio Gurabo at Los Quemados.

Genus LIMOPSIS Sassi

Limopsis ovalis Gabb

Plate 26, Figure 10

Limopsis ovalis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 255, 1873.
Limopsis ovalis Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 607, 1898.

We collected a single rather worn valve of a *Limopsis* which corresponds to Gabb's description of his unfigured Dominican species *ovalis*. It is somewhat larger than the type and appears to be an aged shell, showing to a marked degree the oblique outline characteristic of this species on growing older. Greatest length 8.5, altitude 7.5 mm.

Guppy's *L. subangularis* from Trinidad has a much squarer dorsal outline, more prominent beaks, and the ribbing is stronger than the concentric lines. In *ovalis* the ribbing is much feebler than the concentric lines.

Locality.—(Exp'd '16) Between Hato Viejo and Potrero, Rio Amina.

Limopsis hatoviejonis, n. sp.

Plate 26, Figure 11

Shell resembling in form *L. subangularis* from Pointapier, Trinidad, but more elegantly sculptured, and with four strong hinge teeth in both anterior and posterior series with sometimes a weak fifth tooth, while *subangularis* has only about three in each series. The outline is suborbicular, somewhat oblique; hinge line very straight, not sloping as in *ovalis*; right and left valves equal but the sculpture slightly discrepant, the radials being stronger on the right valve. Concentric sculpture stronger than indicated in *subangularis* and consisting of thick, rounded, close-set, cord-like ridges, with much narrower interspaces, the latter almost linear; radials delicate but sharp, thread-like, with much wider interspaces; the radials are waved in crossing over the concentric cords. The inner margin of the valves is crenulated by the radials. Ligament pit small, triangular, dividing the teeth into an anterior and posterior series; teeth irregular, the anterior nearly vertical, posterior very oblique. Length 7, altitude approximately 7 mm. A rare and exquisite little shell.

Locality.—(Exp'd '16) Between Hato Viejo and Potrero, Rio Amina.

Genus Arca Linné

Dr. Pearl Sheldon, whose fine Monograph on Atlantic Slope Arcas has lately appeared, has very kindly examined our Santo Domingo Arks, and discriminated most carefully between the species, the majority of which are new. Her expert and intimate knowledge of the genus gives to these discriminations a high value.

Arca occidentalis Philippi

Plate 29, Figure 3

Arca occidentalis Philippi, Abbild. u. Beschr., 3, p. 14, pl. 17b, fig. 4a-c, 1847.

Arca noæ Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 293, 1866.

Arca occidentalis Guppy, *Id.*, vol. 32, p. 531, 1876.

Arca occidentalis Sheldon, Palæont. Amer., vol. 1, p. 8, pl. 1, figs. 8-11, 1916.

Our fossils from the bluffs seem identical in every respect with recent shells of this species from the Monte Cristi beach. The species has been reported from Bowden, and is widespread in the Pleistocene and recent Antillean faunas.

Localities.—(Exp'd '16) Zone D, Rio Gurabo at Los Quemados; Zone H, Rio Cana at Caimito.

Arca umbonata Lamarck

Plate 30, Figure 11

Arca umbonata Lamarck, An. s. Vert., vol. 6, p. 37, 1819.

Arca imbricata Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 254, 1873.

Arca umbonata Sheldon, Palæont. Amer., vol. 1, p. 8, pl. 1, figs. 12-17, 1916.

Our fossil shell is exactly like the recent from the Monte Cristi beach but smaller. The species occurs in the Oligocene of Florida and in the Antillean Pleistocene and recent faunas, but has not been found at Bowden.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito.

Arca lomasdesamba, n. sp.

Plate 30, Figure 12,

Shell resembling in general form the young of *A. occidentalis*, but the ribs are more uniform and more nodulous. The whole plan of sculpture is more elegant. *A. occidentalis* characteristically has a nearly smooth band (with a group of fine threads) over the umbonal ridge, and another similar band along the posterior dorsal margin; between these bands is a pronounced sulcus containing a few normal ribs. The specimen now described shows only very slight development of bands, and the sulcus is much less pronounced. Length of shell 32, altitude 14, thickness of both valves 14 mm.

The Chipola analogue is *A. paratina* Dall, which is smaller, with much finer ribbing.

Locality.—(Exp'd '16) Samba Hills, altitude approximately 540 feet.

Arca yaquensis, n. sp.

Plate 30, Figure 14

We have about sixteen valves of a minute, true Ark without special characters, but apparently not the young of any other species. It is not alate, but is obliquely truncate posteriorly, and there is no differentiation of the ribs over the rounded, not angular, umbonal ridge. Exteriorly the shell somewhat resembles a *Scapharca*. Perhaps the shell is not quite mature, since the margin is still crenulate. Length 9, altitude 4.75 mm

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Localities.—(Exp'd '16) Bluffs 2 and 3, Cercado de Mao; Zone I, Rio Cana at Caimito.

Subgenus BARBATIA Gray

Barbatia cf. Bonaczyi Gabb

Plate 30, Figure 15

We have a number of valves of a small, thin *Barbatia* which is either the unfigured *B. Bonaczyi* Gabb or new. Dall has united Gabb's species with *A. umbonata*, a true Ark; but the main point of Gabb's indefinite description seems to be that this species is nearest *B. barbata*, but has a more produced and sloping posterior end. Ours is only half as large but may not be adult.

Cardinal area as in *B. barbata;* ends of the hinge more angular; teeth with a short vacant gap between the short anterior and long posterior series; beaks within the anterior fourth; sculpture anterior to the umbonal ridge of fine, beaded, radial riblets, anteriorly more widely spaced at intervals, giving the ribs a grouped appearance as in *B. barbata;* umbonal ridge more marked than in *barbata;* posterior ribs larger, dominating the concentric sculpture which is prominent on the face; a group of fine ribs lies next the hinge; shell produced and pointed along the umbonal ridge; posterior margin oblique. Length 18, altitude 10, semi-diameter 3 mm.

We have a larger valve from the Samba Hills which may be a variation of this species, but it is thicker, the beaks are less anterior, the cardinal area wider, and the teeth are shortest near the middle, growing evenly longer distally, and there is no gap.

Localities.—(Exp'd '16) Zone D, Rio Gurabo at Los Quemados; Samba Hills at approximately 540 feet altitude.

Barbatia (*Calloarca*) *submarylandica*, n. sp.

We found several fragments of a large *Arca* of the *A. candida* group, but not that species because the characteristic large anterior and posterior ribs are lacking. In the shell described the ribs on the anterior and posterior slopes are no larger than on the rest of the valve. The ribbing is almost identical with that of *A. marylandica* Conrad, which is typical of the Maryland Miocene, but also occurs in the Oligocene Tampa silex bed. As exceedingly few species are common to the latter horizon and to the blue clays of Santo Domingo an absolute specific identity seems, however, improbable.

Localities.—(Exp'd '16) Guayubin to Mao road; Zone H, Rio Cana at Caimito.

Barbatia (*Acar*) *reticulata* Gmelin

Plate 30, Figure 16

Arca reticulata Gmelin, Syst. Nat., vol. 6, p. 3311, 1792.
Arcr reticulata Sheldon, Palæontographica Americana, vol. 1, p. 20, pl. 4, figs. 8-12, 1916.

This richly sculptured Ark is very rare in the Dominican blue clays, in which it has never before been found. It occurs as a fossil at Bowden, Matura (Trinidad), Tampa silex bed, Chipola marls and elsewhere and is now living in the Antilles.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (A single valve).

Subgenus NOETIA Gray

SECTION SHELDONELLA, new section

Noëtia (*Sheldonella*) *maoica*, n. sp.

Plate 30, Figures 17, 18

Shell small, thin; sculpture as in *N. incile* or typical *limula;* hinge and cardinal area as in *Noëtia;* the anterior half of the ligament area with transverse grooves; ligament area extending about half way from the beaks to the posterior end of the hinge; inner margin crenulated; posterior margin with an angle near the hinge as in *N. bisulcata* and typical *limula;* shell probably equivalve. The striking feature of this shell is its form. The umbonal ridge is not angular as in the rest of the *Noëtiæ*, but that region is roundly and excessively inflated. The outline is trigonal, the anterior part very small, with beaks at the anterior fifth, posterior part widely spreading. A sinus extends to the well developed notch in the anterior ventral margin. Length 12, altitude beak to base 6, posterior altitude 13.50, semi-diameter 4 mm.

The general appearance of this shell recalls some of the deep water species like *Bathyarca pectunculoides*, *B. culebrensis*, *Cucullaria asperula*, *and C. sagrinata* although there is no gap in the teeth as in many such forms. Because of the variation from typical *Noëtia*, and the possible analogue with deep water forms, it seems best to establish for it the new section *Sheldonella* to contain thin, small, trigonal *Noëtias* without the angular umbonal ridge.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao (Extremely abundant).

Subgenus SCAPHARA Gray

Scapharca Henekeni, n. sp.

Plate 29, Figure 2

Arca consobrina Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 52. pl. 10, fig. 12, 1849.

Not *Arca consobrina* d'Orbigny, Pal. Française, Terr. Crétacés, vol. 3, p. 209, pl. 311, figs. 4-7, 1844.

Arca consobrina Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 531, 1876.

Arca consobrina Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p, 646, 1898.

Arca consobrina Sheldon, Palæont, Amer., vol. 1, p. 49, 1916.

As Dr. Dall and others have pointed out, Sowerby's name is preoccupied. The writer would suggest as a new name *Henekeni*, in honor of Colonel Heneken by whom the type was collected.

This *Scapharca* belongs to a group comprising many species of which *hypomela*, *lienosa*, *secticostata*, *and halidonata* are well-known members. The principal feature of the species is its grooved and beaded ribs, numbering thirty-five or thirty-six; the anterior ribs show a deep medial groove extending well up towards the beaks, and on each side of this a shallower groove; the central ribs just anterior to the umbonal ridge have several longitudinal grooves; the ribs of the posterior slope beginning near the angle of the umbonal ridge are flatter, nearly smooth, and little sulcate. The ribs are wider than the interspaces and crossed by concentric raised lines which produce a beaded appearance especially near the center of the shell. Compared with other West Indian species of the same group it is distinguished by its oblong form, base nearly parallel to the hinge, and less produced umbonal ridge. Length 50, altitude 29, thickness of one valve 15 mm.

Fide Dall, Guppy's *A. consobrina* from Jamaica is *halidonata* Dall, which is shorter and higher, with a more arcuate base.

Localities.—(Exp'd '16) Bluff 2, Cercado de Mao; Zone B, Rio Gurabo at Los Quemados. Valves probably young of this species were found in Bluff 3, Cercado de Mao and on the Samba Hills at approximately 540 feet altitude.

Scapharca golfoyaquensis, n. sp.

Plate 28, Figure 5

This is another member of the group to which *A. Henekeni* belongs. The ribs number thirty-eight and the ribbing is nearly the same, but the central ribs appear to be narrower and less divided. The central ribs of the left valve are conspicuously beaded while those of the right valve are smoother, flatter and more square, whether the latter character is true of *Henekeni* we do not know as all our valves are left. The chief difference between *A. Henckeni* and *golfoyaquensis* lies in the form, the latter species being conspicuously and constantly much more produced and pointed posteriorly, the beaks are fuller and more anterior. Instead of being oblong the shell is broad posteriorly and narrow anteriorly ; cardinal area long and moderately wide, with a few concentric grooves; hinge line long with numerous vertical teeth somewhat oblique at the posterior end of the series. Length 59, altitude 31, thickness of one valve 16 mm.

Localities.—(Exp'd'16) Zones B, F, G, Rio Gurabo at Los Quemados; Zone H, Rio Cana at Caimito; Bluff 1, Cercado de Mao.

Scapharca cercadica, n. sp.

Plate 29, Figure 5

Shell thin and fragile for the group; elegantly and finely sculptured; anterior margin rounded, apparently meeting the hinge at an angle but both ends of the hinge are broken in our single specimen; basal margin nearly straight and parallel to the hinge; posterior margin oblique, not straight but slightly sinuous above, as shown by the growth-lines, and broadly, evenly and gracefully curving into the ventral margin; ribs thirty-four, wider than the interspaces, those anterior to the umbonal ridge very evenly, dichotomously divided for nearly their entire length by a sulcus two-thirds as wide as the interspaces; there are no secondary grooves except faint traces on the umbonal ridge; posterior ribs smoother and flatter, with a less pronounced incised line; ribs and interspaces crossed by fine, even, close-set, concentric lines; hinge long and narrow, central portion broken away, distal teeth delicate and short, anterior vertical, posterior no larger than the anterior, barely inclined Length 50, altitude approximately 25 mm.

This rare and elegant *Scapharca* cannot be confused with any of our other Dominican species.

Locality.—Exp'd '16) Bluff 1, Cercado de Mao.

Scapharca Margaretæ, n. sp.

Plate 28, Figure 1

Shell large, oblong, solid, ribs thirty-one, entire, narrower than the concave interspaces and flat-topped or slightly rounded; ribs and interspaces crossed by fine, even, concentric threads forming arches over the ribs and loops in the interspaces; the ribbing is very similar to that of *Anadara aresta* and *A. campsa*, from the Florida Miocene; some of the ribs distally show a mere trace of a mesial groove; hinge line long with numerous teeth nearly vertical except at the posterior end where they are somewhat longer, slightly inclined and somewhat broken up; cardinal area wide for the group, with about five concentric, somewhat irregular grooves. Length 81, altitude 50, thickness of both valves 49 mm.

This species is superficially somewhat like *A. secticostata* Reeve, but the ribs in that species are deeply grooved.

Locality. — (Exp'd '16) Rio Cana, Guayubin to Mao road.

Scapharca guayubinica, n. sp.

Plate 28, Figure 4; Plate 29, Figure 1

Shell ventricose, ribs twenty-nine; beaks mesially impressed; cardinal area moderately wide with about four concentric grooves, part of which do not extend ahead of a V-shaped groove connecting the beaks, with the point turned backwards; hinge line long with numerous teeth forming two series, the anterior vertical, the posterior series about one and a half times as long, gradually increasing in length posteriorly, the posterior teeth somewhat inclined. Length 45, altitude 31, diameter 29 mm.

This species is very similar to *A. Margaretæ* excepting that the hinge is comparatively wider and the shell only half as large. Specimens in our Gabb collection appear to be mature and a valve of ours from Rio Cana, 53 mm. in length, has every appearance of an aged shell, while *A. Margaretæ* though twice as large does not appear senile.

Locality.—(Exp'd '16) Rio Cana, Guayubin to Mao road.

Scapharca riogurabonica, n. sp.

Plate 29, Figure 4

We collected a number of similar valves identical with one in the Gabb collection, which like the preceding was in Gabb's box of "*Arca consobrina*". This species is smaller than *A. guayubinica* and more produced along the umbonal ridge, with a more marked angle between the posterior and ventral margins; it is less inflated anteriorly. In *A. guayubinica* the anterior and basal margins are distinct and meet in a broad curve, while in the species now described the two tend to form a point near the hinge to the posterior angle. The sculpture of this species is more elegant, the undivided ribs, which number twenty-eight, have more of a tendency to be rounded at the top; in two valves which belong together the ribs of the left valve are rounded on the center of the shell, while on the right valve they are square-topped and less ornamented; this difference tends to occur also in *A. Margaretæ* and *guayubinica*, but is more marked in *riogurabonica*. Length 40, altitude 25, diameter 26 mm.

A complete series may prove this a mutation of *A. guayubinica* characteristic of the Rio Gurabo.

Locality.—(Exp'd. '16) Zones A and B, Rio Gurabo at Los Quemados.

Scapharca inæquilateralis, Guppy

Plate 30, Figure 8

Arca inæquilateralis Guppy, Quart. Jour. Geol. Soc., London, vol. 32, p. 293, pl. 18, fig. 2, 1866.

Scapharca (*Scapharca*) *inequilateralis* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 647, 1898.

Arca inequilateralis Sheldon, Palæont, Amer., vol. 1, p. 50, 1917.

A comparison of our specimens from the Guayubin to Mao road, Rio Cana, with *A. latidentata* Dall from the Chipolan beds, Florida, shows that Dr. Dall's remarks are very fitting. *A. inæquilateralis* can be distinguished from its Floridian analogue by the shorter, more delicate and much more numerous hinge teeth, less inflated form, and more elegant sculpture. Length 29, altitude 15, semidiameter 6 mm. This pretty, delicate *Arca* occurs at Bowden but has never before been found in Santo Domingo.

We have a number of specimens from the Gurabo and Cana Rios which apparently belong to this species, but are uniformly more solid and inflated. A large valve measures 29 in length, 15 in altitude, semidiameter 7 mm.

Localities.—(Exp'd '16) Guayubin to Mao road, Rio Cana; Zone I, Rio Cana at Caimito; Zone G, Rio Gurabo at Los Quemados.

Scapharca losquemadica. n. sp.

Plate 30, Figure 1

We collected three left valves of an *Arca* resembling *A. inæquilateralis* and *A. dariensis.* Ribs about thirty, the anterior sulcated and wider than the interspaces, anterior central ribs high, rounded and very narrow; posterior central ribs larger, higher, rounded, somewhat sulcated; posterior ribs beginning at, or somewhat anterior to, the umbonal ridge, wide, low, flat and square-topped with an incised groove; these posterior ribs are smooth; the rest are nodulose. Hinge line long with an angle at each end; teeth fine and numerous, vertical except at the posterior end where they are somewhat inclined; cardinal area narrow, with a few grooves. Length 37, approximate altitude 20, semidiameter 8 mm. All the full grown shells are imperfect so a young shell has been figured.

This species should perhaps be classed as a variety of *A. inæquilateralis*, but is much larger and the depth is proportionately greater anteriorly. The ribbing is practically the same. Our shell is also akin to *A. dariensis* Brown and Pilsbry from Gatun; but the description of that species implies that the posterior as well as the anterior ribs are nodulose, and the posterior basal curve is different.

Locality.—(Exp'd '16) Zone E, Rio Gurabo at Los Quemados.

Scapharca caimitaca, n. sp.

Plate 30, Figure 13

This small species belongs to the group of which *A. transversa* in the recent representative. Ribs about thirty, narrow, entire, rising sharply from the nearly equally wide, flat interspaces, ribs triangular in cross section, with the medial line distinctly angulated; both ribs and interspaces are crossed by concentric lines which produce a moderate beading. The right valve is too worn to show if its sculpture is similar to that of the left. Hinge line about two-thirds the length of the shell; teeth small, vertical, in two series of nearly equal length; cardinal area small, nearly equilateral, with margins somewhat raised; grooves three; beaks small, low, mesially impressed; shell ventricose, roundly inflated; posterior margin evenly rounded, not truncate; anterior and posterior margins meeting the hinge at an angle; inner margin of shell crenulate. Length 29, altitude 19, semidiameter 8.50 mm.

Locality.—(Exp'd '16) Zone A, Rio Cana at Caimito.

Scapharca cibaoica, n. sp.

Plate 30, Figure 19,

Shell rude, very small, thin, inflated, oblong, base sinuous, nearly parallel to the hinge, anterior and posterior ends rounded; beaks higher, narrower and more pointed than usual in shells of this general form; a broad, well-developed sinus extends from the beaks to the base; beaks at the anterior third; ribs twenty-two, about as wide as the interspaces; low, flat, square-cornered and without ornamentation, one or two secondary ribs may arise in the interspaces in the sinus; cardinal area long and narrow, with elevated margin behind the beaks, short and wider in front; hinge narrow; teeth fine, vertical except at both ends where they are longer and slightly inclined; inner margin crenulate. Length of largest shell 11, altitude 7, semidiameter 4 mm.

This little shell is characterized by its rude sculpture, subcentral sinus and narrow beaks.

Localities. —(Exp'd '16) Bluffs 2 and 3, Cercado de Mao; Zone I, Rio Cana at Caimito.

Scapharca patricia Sowerby

Plate 27, Figure 1

Arca Patricia Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 52, 1849.

Arca patricia Moore, Quart. Jour. Geol. Soc., vol. 9, p. 129, 1853.

Arca (*Anadara*) *grandis* Gabb, Trans. Amer. Phil. Soc. vol. 15, p. 253, 1873.

Arca patricia Guppy, Geol. Mag. London, p. 443, 1874; Quart. Jour. Geol. Soc., vol. 32, p. 531, 1876.

Arca grandis Gabb (in part), Jour. Acad. Nat. Sci. Phila., vol. 8, sec. ser., p. 378, 1874-1881.

Arca patricia Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, pp. 642, 658, 1898.

Arca patricia Sheldon, Palæontographica Americana, vol. 1, p. 49, 1916.

This shell is exceedingly close to the West Coast *A. grandis.* Sowerby's distinctions hold only for individual specimens. Gabb confused the smaller related species, *A. chiriquiensis*, with the young of *A. patricia.* No one has recognized both these species. Sowerby had the larger (*A. patricia*) and Dall had the smaller (*A. chiriquiensis*), while Gabb had both, but thought them the same. This has been clearly elucidated by Dr. Sheldon. Guppy reported *A. patricia* from the Caroni Series, Trinidad. This great Ark has never heretofore been figured.

Localities.—(Exp'd' 16) *In situ*, 1st, 2d and 3d *Arca patricia* beds, Caimito, Rio Cana (see section); loose at Sabaneta, and very abundant in the lower reaches of the Rio Cana at the crossing of the Mao to Guayubin road.

Scapharca chiriquiensis Gabb

Plate 28, Figure 2

Arca chiriquiensis Gabb, Proc. Acad. Nat. Sci. Phila., vol. 12, p. 567, 1861;

Arca grandis Gabb (in part) Jour. Acad. Nat. Sci. Phila., vol. 8, p. 378, 1874-1881. Exclude *A. patricia* and *A. grandis.*

Scapharca (*Scapharca*) *chiriquiensis* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 642-643, 1898.

Arca chiriquiensis Sheldon, Palæontographica Americana, vol. 1, p. 49, 1916.

The Floridian shell, *A. staminata* Dall has a superficial resemblance to *A. chiriquiensis* but the real relationship of the Dominican fossil is with *A. patricia* and the latter's descendant, *A. grandis.* *Arca chiriquiensis* has been reported by Dall from the Oligocene of Chiriqui, Central America, and from an island in Lake Henriquillo, southern Santo Domingo.

Locality.—(Exp'd '16) Sabaneta to Guayubin road (Abundant and *in situ*).

Scapharca auriculata Lamarck

Plate 28, Figure 3

Arca auriculata Lamarck, An. s. Vert., vol. 6, p. 43, 1819.

Arca (*Scapharca*) *auriculata* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 649, 1898; *Id.* pt. 6, p. 1586, 1903.

Arca auriculata Sheldon, Palæontographica Amer., vol. 1, p. 50, pl. 11, fig. 19, 1916.

Our fossil is identical in every respect with recent shells on the Monte Cristi beach. *A. auriculata* occurs at Bowden and in the Limon, Costa Rica, Pliocene. It is now reported for the first time from the Dominican Tertiaries.

Locality.—(Exp'd '16) Sabaneta (loose, not *in situ*).

Scapharca cor-cupidonis, n. sp.

Plate 30, Figures 5, 6, 7

Shell small, cordiform, solid, inequivalve, the left extending considerably beyond the right: the posterior part of the shell is short but the posterior margin is curved, not straight; anterior and ventral margins rounded; shell roundly and excessively inflated. The ribs number very uniformly twenty-five, those of the left valve do not vary much but the posterior are somewhat smaller and those ending at the anterior ventral margin are largest; the ribs are about as wide as the interspaces except anteriorly where they are more widely spaced, all the ribs of the left valve are handsomely and evenly nodular; right valve with anterior ribs nodulose as in the left, central ribs and those over the umbonal ridge narrow and smooth; ribs on the dorsal half of the posterior slope nodulose. Beaks high, narrow, pointed, strongly incurved and directed forward; cardinal area with a few grooves, wide in front of the beaks, narrow, with a raised margin behind; hinge line about two-thirds the length of the shell; teeth medium in size, the posterior series about twice as long as the anterior, teeth vertical except at the ends of the series where they are slightly longer and oblique but not conspicuously so. Length 21, altitude 21, diameter 21, a more inflated shell measures in length 21, altitude 24, diameter 24 mm. *Arca filicata* Guppy from the Manzanilla beds, Trinidad, appears to be similar to this species.

Localities.—(Exp'd '16) Bluff 2 (comparatively scarce), Bluff 3 (exceedingly abundant and all ages) Cercado de Mao.

Scapharca hispaniolana, n. sp.

Plate 30, Figures 9, 10

In our Gabb collection there is a complete specimen, and two left valves, of a form somewhat resembling *A. cor-cupidonis.* Like that, this species is inequivalve, small, solid and high, and the beaks, cardinal area and hinge are similar. The left valve is also handsomely nodulose, but the ribs, numbering twenty-five, are wider than the interspaces and the anterior ribs are not so widely spaced as those of *cor-cupidonis;* the ribs on the center of the right valve are about as wide as the interspaces and are somewhat less nodulose but *not smooth* and the discrepancy in sculpture of the two valves is not marked; the umbonal ridge is angular and there is a broad sulcation anterior and parallel to it. Length 22, altitude 22, diameter 22 mm.

This species can be distinguished from *A. cor-cupidonis* by its lack of discrepant sculpture, and by the umbonal ridge, *angular* instead of evenly rounded. We collected hundreds of the former species but not one of this sort which Gabb must have obtained from a locality we did not visit. This species closely resembles in appearance *A.* (*Cunearca*) *Chemnitzi*, which we collected on the Monte Cristi beach, but the cardinal area of the fossil is that of a true *Scapharca.* Our shell also has some resemblance to *A. chemnitzoides* Maury from the Oligocene of Trinidad but that, like *Chemnitzi* is a *Cunearca.*

Scapharca riocanensis, n. sp.

Plate 30, Figures 3, 4

Shell small, subquadrate, rather thin, roundly inflated; ribs twenty-eight, style of ribbing almost precisely as in *A. cor-cupid-*

onis, discrepant on the two valves; anterior margin rounded, extending beyond the end of the hinge; ventral margin rounded; posterior straight. Shell externally very like *A. cor-cupidonis* but very much thinner, and that species has a sinuous posterior margin, rather broadly rounded at the end of the umbonal ridge while this shell has a straight posterior margin; is less rounded at the base, and the posterior end of the hinge line is longer and extends upward, giving the shell a winged appearance although it is not alate as that term is used in the true Arks. In *A. cor cupidonis* the cardinal area is inclined upward from the top of the hinge to the beaks making them appear high; in this species the cardinal area is flat posteriorly and anteriorly slopes downward from the hinge so that as seen from the interior the point of the beak is about level with the upper margin of the hinge. The beaks are also less twisted; exteriorly the beaks of both appear high and narrow; the cardinal area in both has two or three grooves and elevated margins; but the hinge of *A. riocanensis* is longer, more markedly angled at the ends, and much narrower, the teeth proportionately short and delicate. Length 25, altitude 23, semidiameter 11 mm. This shell may attain a larger size· Though superficially similar to *A. cor-cupidonis* it is really a very different species.

Locality.— (Exp'd '16) Zone H, Rio Cana at Caimito. (Not common).

Scapharca Pennelli Gabb

Plate 29, Figure 8

Judging from the specimens in our Gabb collection, Gabb had two distinct forms confused in his species *A. Pennelli.* It seems best to limit that designation to the shell which fits his description. As shown by the figure which is of one of Gabb's specimens, it is characteristically more oblique, thinner, and the ribs less beaded than the other form which we have named *S. Arthurpennelli. A. Pennelli* apparently is comparatively a rare shell, the other species being the one which we found so abundant.

Scapharca Arthurpennelli, n. sp.

Plate 29, Figures 9, 10

This is probably the form which Gabb had in mind when he spoke of the abundance of *A. Pennelli*; but neither Gabb's specimens nor ours correspond to his description of that species. This shell is not an *Anadara* since it is inequivalve. It is not very oblique, and the left valve is handsomely beaded, though the ribs of the right valve are smoother, the sculpture being somewhat discrepant. The ribs number thirty; the shell has a general resemblance to the round, inflated, typical *Argina campechensis* Dillwyn; but is more solid and the cardinal area is too wide for *Argina* except in a few individuals. There are several grooves, part of which extend in front of the beaks. The hinge is wide with long, irregular teeth which somewhat resemble those of *Argina* but are less abnormal. The species is intermediate between *Scapharca* and *Argina*. Many of the specimens, both ours and Gabb's, are characterized by a heavy callus at the anterior basal margin. Those individuals which have this to an extreme form appear pathologic. Length 35, altitude 32, semidiameter 15 mm. Besides hundreds of our own shells we have a large number loaned by the American Museum, collected at Bulla River (see sketch map).

Arca tolepia Dall appears to be similar to *A. Arthurpennelli* but is described as thin, the sculpture of the right valve is different from ours and the cardinal area is so narrow behind the beaks that Dall placed the species in *Argina*. Our shell is remarkably heavy and thick for its size and the cardinal area is too wide for *Argina*.

Localities.—(Exp'd '16) Bluff 2, Cercado de Mao (comparatively scarce); Bluff 3 (exceedingly abundant, all ages and sizes).

Scapharca (*Argina*) *tolepia* Dall

Arca pexata Guppy, *Fide* Dall, Geol. Mag. London, p. 443, 1874; Not of Say 1822.

Scapharca (*Argina*) *tolepia* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p, 649, pl. 33, figs. 7, 8, 1898.

Scapharca (*Argina*) *tolepia* Sheldon, Palæont. Amer., vol. 1, p. 63, pl. 15, figs. 14, 15, 1916.

This species is an *Argina* very close to the typical recent *campechensis*. The type locality is Rio Amina. It has also been found at Bowden and Cumana.

Scapharca (*Cunearca*) *Willardausteni*, n. sp.

Plate 29, Figures 6, 7

Shell inequivalve, thin, oblique, produced along the umbonal ridge; teeth, hinge and cardinal area as in *Cunearca* but the area is rather long and narrow for the group, and sometimes marked with one or two irregular grooves parallel to the hinge margin. On both valves there are two shallow sulci, one as usual anterior to the umbonal ridge, the other slightly anterior to the center of the valve, extending to the point on the ventral margin where the extension of the left valve abruptly begins. Ribs about thirty-six; those anterior to the median sulcus with transverse nodules; all those posterior to this sulcus smooth on both valves; sculpture nearly the same on both valves except that the smooth central ribs on the face of the left valve are much wider than the interspaces; while on the right little wider than the interspaces. Right valve sometimes with an obscure interstitial line near the umbonal ridge. This species is separated from other *Cunearcas* by its oblique, produced posterior end and by the smooth ribs on the face of the left valve. It lacks to some degree the erect, well-sculptured appearance usual in *Cunearca*. Length 42, altitude 32, semidiameter 14 mm.

A. cumanensis Dall from Bowden and Cumana is also a member of the *A. incongrua* group but is much smaller, and is short and high with high, prominent beaks while the reverse is true in our shell.

I take great pleasure in naming this shell in honor of Mr. Willard Austen, Librarian of Cornell University, in appreciation of his so kindly facilitating the literary part of this investigation.

Locality—(Exp'd '16) Zone H, Rio Cana at Caimito.

Scapharca (*Cunearca*) *cumanensis* Dall

Arca incongrua Guppy, Proc. Sci. Assoc., Trinidad, p. 163, Dec., 1867; Geol Mag. London, p. 451, 1874. Not *A. incongrua* Say.
Scapharca (*Cunearca*) *cumanensis* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 633, 1898.

Described as a miniature *A. incongrua* but higher, shorter; with more prominent and more anterior beaks, shorter hinge line; ribs of posterior slope of right valve smooth instead of nodulose. Length 26, altitude 25, diameter 21 mm.

Oligocene of Cumana (Guppy); island in Lake Henriquillo, Southern Santo Domingo (Powell).

Note.—Gabb described an *Arca multilineata* from Santo Domingo. This shell is characterized by its thin, globose form and sixty small, square ribs. Gabb likens it in some respects to *A. centenaria.* We have no representative of *A. multilineata* in our collections and merely add this for completeness. *A. Websteri* Brown and Pilsbry is an unfigured species from Haiti.

Genus GLYCIMERIS Da Costa

Glycimeris acuticostata Sowerby

Plate 26, Figure 12

Pectunculus acuticostatus Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 53. pl. 10, fig. 13, 1849.
Pectunculus acuticostatus Guppy, *Id.*, vol. 22, p. 293, 1866.
Axinea acuticostata Gabb, Trans, Amer. Phil. Soc., vol. 15, p. 255, 1873.
Pectunculus acuticostatus Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 532, 1876.
Glycymeris acuticostata Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 608, 1898.
Glycymeris acuticostata Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., p. 364, 1911.

A common species in the blue clays; characterized by its slightly oblique form and sculpture of thirty sharp, narrow, radiating ribs with concave, often angulated, interspaces. Length 24, altitude 23, semidiameter 7 mm. Also reported from Cumana, Bowden and Gatun.

Localities.—(Exp'd '16) Bluffs 1 and 2, Cercado de Mao; Zones B and F, Rio Gurabo at Los Quemados; Samba Hills, approximate altitude 540 feet; trail Hato Viejo to Potrero, Rio Amina.

Glycimeris jamaicensis Dall

Plate 26, Figure 13,

Pectunculus pennaceus Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 293, 1866. Not of Lamarck.

Axinea pennacea Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 255, 1873.

Pectunculus decussatus Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 532, 1873. Not of Hanley.

Glycymeris jamaicensis Dall, Trans. Wagner Inst., vol. 3, pt. 4, p. 608, 1898: pt. 6, p. 1586, 1903.

We found this a rarer species than the preceding. It appears to be the ancestor of the Miocene-Recent *G. pennacea* Lamarck, which it closely resembles. The Bowden shell was differentiated from the recent by Dr. Dall whose description applies to our Dominican shells. The Gatun analogue is *G. carbasina* B. and Pils.

Localities.— (Exp'd '16) Zone I, Rio Cana at Caimito; Zone G, Rio Gurabo at Los Quemados.

Genus PTERIA Scopoli

Pteria inornata Gabb

Plate 26, Figure 14

Avicula inornata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 253, 1873.

Pteria inornata Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 669, 1898.

We have a large series of all ages and sizes of a *Pteria* which answers to Gabb's description of this unfigured species. Considerable variation is shown in the size of the ears, the anterior in some shells being unusually large. The outer layer of the shell is generally worn off, leaving the nacreous under layer exposed; but sometimes the outer remains and is prettily ornamented by a series of wavy, concentric chestnut lines on a deep cream background.

Localities.—(Exp'd' 16) Bluff 3 (very common), Bluff 2 (very rare), Cercado de Mao.

Genus OSTREA Linné

Ostrea haitensis Sowerby

Plate 31, Figures 1, 2

Ostrea Haitensis Sowerby, Quart. Jour. Geol. Soc., London, vol. 6, p. 53, 1849.

Ostrea Haytensis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 257, 1873.

Ostrea haitensis Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 532, 1876.

Ostrea haitensis Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 685, 1898: pt. 6, p. 1586, 1903.

Sowerby's type had only six or seven large plications, but one of our specimens has as many as fourteen, but six are stronger than the rest. Our shell bears a marked resemblance to Gabb's Post-Pliocene Californian *O. Veatchii*, which *fide* Gabb and Dall is identical with the Dominican species. We have a very fine, large specimen of *O. haitensis*, its length 122, altitude 140, semidiameter 25 mm. This species occurs at Bowden, and in the Chipola and Oak Grove beds, Florida.

Localities—(Exp'd '16) Zone D, Rio Gurabo at Los Quemados; Escalantes.

Ostrea Gilbertharrisi, n. sp.

Plate 32, Figures 1, 2, 3

Shell large, thick and heavy, right valve deeper than the left with a prominent, rounded, sub-central ridge extending from the umbo halfway to the ventral margin, surface covered with irregular, concentric lamellæ; not plicate radially; as seen from the interior, the right valve bears two deep, concave, sinuous undulations, one very broad, anterior, the other deeper, posterior; between the two is a convex, tongue-like prolongation of the posterior basal margin; on the inside of the left valve these undulations are reversed, there being two convex and one very deep concave fold so that the valves interlock as shown in the figure. The hinge is remarkable for the presence of two equal and equidistant pits on either side of the ligament pit. This condition may be pathological but, as shown by the figure of the interior, it suggests the multiple pits of *Gervillia* and *Perna*. Length 110, altitude 120, diameter 60 mm.

Of the *Ostreas* in the Cornell collections this species most resembles *O. sellæformis* Conrad but that species is broad at the hinge while ours is narrow and sloping. The peculiar saddle-like undulations are, however, like those of the Eocene species. Our shell is named in honor of Professor Harris, without whose encouragement and most effective aid on all sides, this work would never have been done.

Locality.—(Exp'd '16) Bluffs of Rio Gurabo.

Ostrea megodon Hanley

Plate 34, Figure 3

Ostrea megodon Hanley, Proc. Zool. Soc. London, p. 106, 1845.

Cf. *Ostrea cerrosensis* Gabb, Geol. Surv. California, vol. 2, p. 35, pl. 11, fig. 61, 1869.

Ostrea megodon Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 685, 1898; pt. 6, p. 1586, 1903.

A striking species, sickle-shaped, with four or five large, marginal, tooth-like folds. Adult attached by the apex only, as one of our shells clearly shows.

This species was founded on a recent shell from Peru in Cuming's collection. Gabb described a very similar shell from the Californian Post-Pliocene as *O. cerrosensis*, which Dall united with *megodon*. It is a curious and interesting fact that the two species *megodon* and *haitensis* (or their descendants) should be found in the Santo Domingo and Bowden beds and on Cerros Islands off the Californian coast. It recalls the case of *Venericardia planicosta*, long extinct on the East coast but with the descendants of migrants still living on the West Coast. *O. megodon* is now reported for the first time from the Dominican blue clays.

Localities.—(Exp'd '16)—Guayubin to Mao road, and the *Teredo* zone, Rio Cana at Caimito.

Ostrea virginica Gmelin

Ostrea virginica Gmelin, Syst. Nat., p. 3336, 1792.
Ostrea virginica Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 257, 1873.
Ostrea virginica Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 532, 1876.
Ostrea virginica Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 687, 1898.

Fide Dall, citations of this species from beds older than Pliocene are questionable. But our fossils so resemble specimens of *virginica* that I follow Gabb and Guppy in referring them to that species, at least tentatively.

Localities.—(Exp'd '16) Guayubin to Mao road, Rio Cana; Samba Hills at an appromimate altitude of 540 feet; top of Zone D, Rio Gurabo at Los Quemados; Bluff 3, Cercado de Mao.

Genus PECTEN Müller

Pecten soror ? Gabb

Janira soror Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 257, 1873.
Pecten (*Pecten*) *soror* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 712 1898.

Shell very inequivalve, right valve very convex, left concave; ribs twenty to twenty-two, square, crossed by fine squamose lines of growth. Length 48 mm. Gabb notes that this unfigured species is allied to *J. Jacobæus*, *maxima* and *media* but differs from them all in the greater number and minutely squamose character of its ribs.

Guppy reported the shell from Bowden and Cumana. The type locality is Santo Domingo. We have a fragment that may be this species but is too incomplete for positive identification.

Locality.—(Exp'd '16) Bluff 1, Cercado de Mao.

Pecten eugrammatus Dall

Plate 34, Figure 4, 5

Pecten (*Pecten*) *eugrammatus* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 712, pl. 34, fig. 22, 1898.

Shell suborbicular, very inequivalve, with about twenty radiating, sharp ribs, each distinctly medially grooved, separated by deep V-shaped interspaces; ears small, unequal; inner margin of shell deeply fluted; right valve very convex, left much compressed, nearly flat; with one or both edges of the ribs beautifully squamose. Length of a right valve 26, altitude 26, semidiameter 8; corresponding measures of a left valve 23×23×4 mm. The type was described only from a right valve. We have ten left valves,—the first ever found. The edges of the ribs of the right valves are smooth when worn, as in the type, but on fresher shells they appear to be squamose as on the left valves.

Dr. Dall very kindly compared our shells with his type.

Localities.—(Exp'd '16) Samba Hills at an altitude of approximately 540 feet (common). Zones B, F, Rio Gurabo at Los Quemados; trail Hato Viejo to Potrero, Rio Amina.

Pecten (*Æquipecten*) *Thetidis* Sowerby

Plate 34, Figure 6

Pecten Thetidis Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 52. 1849.

Pecten thetidis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 256, 1873.

Pecten thetidis Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 532, 1876.

Pecten (*Æquipecten*) *thetidis* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 714, 1898; pt. 6, p. 1586, 1903.

The type of this unfigured species was collected by Heneken in the Yaqui Valley. We are indebted to Dr. Dall for comparing our shells with his shells from Bowden which in turn were compared with Sowerby's type. The shell is orbicular, with typically nineteen square ribs each with rows of minute spiny squames; interstices in older shells also squamose: ears unequal, with squamose radiating threads. Our largest specimen is 33 mm. in altitude, a small perfect shell measures 17×17, semidiameter 4.25 mm. The species is also found at Bowden and on Curaçao.

Localities. — (Exp'd '16) Zone I, Rio Cana at Caimito; Samba Hills at approximately 540 feet altitude.

Pecten (*Æquipecten*) *scissuratus* Dall

Pecten (*Æquipecten*) *scissuratus* Dall, Trans. Wagner Inst., vol. 3, pt. 4, p. 715, pl. 34, fig. 4, 1898.

Shell moderately compressed; valves nearly equilateral; ribs sixteen; ears small, subequal. Altitude 31, length 30, diameter 6 mm.

Described from Ponton, Santo Domingo, and also found near Colon, Isthmus of Darien.

Pecten vaginulus Dall

Plate 34, Figure 7

Pecten (*Chlamys*) *ornatus* Lamarck ? var. *vaginulus* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 715, 1898.

Our shell has been examined by Dr. Dall and pronounced identical with the type of *P. vaginulus*, an unfigured species described from Bowden. Our specimen has twenty- three ribs with a distinct radial thread in every interspace; ears very unequal. Length of right valve 15, altitude 16, semi-diameter 3 mm. This species is smaller than Gabb's *P. interlineatus* and has more numerous ribs.

Locality.—(Exp'd'16) Samba Hills at an approximate altitude of 540 feet.

Pecten (*Chlamys*) *cactaceus* Dall

Pecten (*Chlamys*) *cactaceus* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p, 716, pl. 34, fig. 2, 1898.

A thin, fragile shell, nearly equivalve, with ten to twelve narrow ribs and wider shallow interspaces with radial threads; whole surface squamose. Altitude 47, length 46, diameter 8 mm. Reported by Dall from the Tertiary of Santo Domingo and the Pliocene of Tehuantepec. It is simply mentioned here as one of the few figured Dominican *Pectens*, but is not represented in our collections.

Pecten (*Nodipecten*) *nodosus* Linné

Pecten nodosus Linné, Syst. Nat., No. 164, 1758.

Pecten magnificus Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 256, 1873.

Not of Sowerby.

Pecten (*Nodipecten*) *nodosus* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 717, 1898.

We collected several imperfect shells resembling recent specimens of *P. nodosus* from St. Thomas. The fossils show but few of the characteristic hollow nodes; but their presence is also variable in the recent shells.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito; Limestone bluff, Rio Gurabo at Los Quemados.

Pecten excentricus Gabb

Plate 34, Figure 8

Pecten eccentricus Gabb, Trans, Amer. Phil. Soc., vol. 15, p. 256, 1873.

Pecten (*Plagioctenium*) *excentricus* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 717, 1898.

Shell with a general resemblance to *P. irradians* Lamarck, but with broader, flatter ribs numbering twenty to twenty-two, sometimes feebly grooved medially; interspaces concave; ribs and interspaces with looped growth lines; ears small. Length of our largest shell 38, altitude 35, semidiameter 11 mm. Gabb gives 25 to 38 for the length of the types.

Our shells appear to be this unfigured species as they accord with Gabb's description.

Localities.—(Exp'd '16) Bluffs 1, 2 and 3, Cercado de Mao.

Pecten (*Plagioctenium*) *Gabbi* Dall

Pecten paranensis Gabb, Jour. Acad. Nat. Sci. Phila., sec. ser., vol. 8, p. 347, pl. 45, fig. 24, 1881. Not of d'Orbigny 1849.

Pecten (*Plagioctenium*) *Gabbi* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 717, pl. 29, fig. 3, 1898.

Shell broad, compressed, oblique, nearly equivalve, with nineteen scabrous ribs and narrower interspaces each with one imbricated riblet. Altitude 48, length 52, diameter 13 mm. Described by Dall from the Oligocene of Antigua and Santo Domingo.

Pecten Thompsoni, n. sp.

Plate 34, Figures 9, 10

Shell thin, delicate, translucent, suborbicular, flattened, inequivalve; ribs eighteen or nineteen, rounded, a little wider than the interspaces, giving a characteristically fluted aspect to the valves; ribs and interspaces smooth except for very fine, raised, concentric growth striæ; *right valve* exceedingly flattened with prominent ears, the anterior noticeably reflexed, deeply notched beneath and sculptured with about five radial riblets more or less squamose, especially that bordering the dorsal margin; a deep sulcus marks the junction of the ear with the umbonal region; posterior ear smaller, sub-triangular, its surface smooth except for concentric growth striæ similar to those on the face of the valve; *left valve* also compressed but gently convex in the umbonal region; ears more nearly equal, the anterior with four to six radial threads and fine growth striæ; the posterior smooth except for the striæ. An average-sized sized right valve measures in length 20, altitude 18, semi-diameter 2; a left valve 18×17×3 mm. This species is readily distinguished by its flattened form, discrepant valves, and large, twisted right ear.

I take the greatest pleasure in naming this striking and graceful *Pecten* in honor of Dr. G. B. Thompson of Bizara, Pondoland East, South Africa, whose devotion to the advancement of the knowledge of the Cretaceous forms has been shown by his collections, made under most difficult circumstances along the wild and uninhabited coast of Pondoland.

Locality.—(Exp'd'16) Bluff 3, Cercado de Mao. (Abundant and characteristic).

Pecten cercadica, n. sp.

Plate 34, Figure 11

Shell fan-shaped, moderately convex, fairly thick but translucent, nearly equilateral, whether equivalve or not I do not know as we found but one valve; surface sculptured with sixteen rounded, radial ribs with narrower interspaces; ribs and interspaces smooth except for fine, concentric growth lines; ears rather large, nearly equal, triangular, feebly radially threaded towards the base, otherwise smooth. Length 29, altitude 27, semidiameter 6 mm. This shell is distinguished from our other *Pectens* by its few ribs, equilateral form and nearly equal, large ears. It has been kindly examined for us by Dr. Dall and not identified with any species in the National Museum, nor does it correspond to any of Sowerby's or Gabb's descriptions of unfigured Dominican species.

Locality.—(Exp'd '16) Bluff 2, Cercado de Mao.

Pecten caimitica, n. sp.

Plate 34, Figure 12,

We collected a single valve of a *Pecten* examined by Dr. Dall and not identified by him with any in the National Museum from Bowden or Santo Domingo. The shell is suborbicular, slightly oblique, convex in the umbonal region but elsewhere rather compressed; surface ornamented with twenty-two narrow, rounded, radial ribs with narrower, concave interspaces: ribs and interspaces marked only by concentric, looped growth lines; ears very small, nearly equal, radially threaded. Length 20, altitude 20, semidiameter 5 mm. The species is distinguished by it more numerous ribs and very small ears.

Locality.—(Exp'd '16) Zone I, Rio Cana at Caimito.

Pecten hatoviejonis, n. sp.

Plate 34, Figures 13, 14

Shell fan-shaped, but markedly oblique; right valve deeper and more convex than the left; ears small; ribs about twenty-one; on the proximal portion of the shell the ribs are narrow, nearly smooth, except on the posterior slope of the right valve where they are somewhat spiny; interspaces deep, concave, marked only with growth lines; suddenly more squamose sculpture developes simultaneously on both valves, the ribs become medially grooved, the interspaces develop two radial threads each, and both ribs and interspaces become decidedly squamose. Leng of shell 24, altitude 23, diameter 12, semidiameter of left valve 5, of right valve 7 mm. This shell has a slight resemblance in sculpture to *P. Gabbi* but that has only one interstitial thread and is twice as large and less oblique in form.

Locality.— (Exp'd '16) Trail from Hato Viejo to Potrero, Rio Amina.

Genus AMUSIUM Bolten

Amusium papyraceum Gabb

Plate 26, Figure 22

Pleuronectia papyracea Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 257, 1873.

Amusium papyraceum Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 718, 1898; pt. 6, p. 1586, 1903.

Shell with one valve concavely flattened, the other slightly convex; resembling the Oriental living species in being entirely smooth externally, except for occasional concentric growth lines. Marked internally with paired radiating ribs. Our most perfect shell measures 60 mm. in altitude and approximately 58 in length, but we collected fragments of much larger specimens apparently 100 mm. in altitude. The Miocene-Recent *A. Mortoni* Ravenel is allied and possibly identical. *A. papyracea* is also found at Bowden, but Santo Domingo is the type locality. The shell has never before been figured.

Localities.—(Exp'd' 16) Samba Hills at an approximate altitude of 540 feet near Los Caobas; Zone F, Rio Gurabo at Los Quemados; Guayubin to Mao road, Rio Cana; Zone I, Rio Cana at Caimito.

Genus SPONDYLUS* Linné

Spondylus bostrychites Guppy

Plate 32, Figure 4

Spondylus bifrons Sowerby, Quart. Jour. Geol. Soc., London, vol. 6, p.

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*The references to this and other genera in the description of our route, pp. 3 to 10, were rough field notes made before the collections were studied.

53, 1849. Not of Goldfuss, 1835.

Spondylus bostrychites Guppy, Proc. Sci. Soc., Trinidad, p. 176, 1867.

Spondylus bostrychites Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 257 1873.

Spondylus bostrychites Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 758, 1898; pt. 6, p. 1586, 1903.

We obtained a number of fine specimens of this unfigured species which occurs also at Bowden. A varietal form, *chipolanus*, has been described by Dr. Dall from the Florida Oligocene.

Localities—(Exp'd '16) Bluff 1, Cercado de Mao (common); Zones B and F, Rio Gurabo at Los Quemados.

Spondylus gumanomocon Brown and Pilsbry

Spondylus Americanus Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 257, 1873. Not of Lamarck.

Spondylus gumanomocon Brown and Pilsbry, Proc. Àcad. Nat. Sci. Phila., p. 514, 1912. (Footnote).

This species is very close to the smaller Gatun *S. Scotti.* It can be readily recognized by its great size and dissimilar valves. We have specimens collected by Gabb as well as our own. One of Gabb's shells renamed by Brown and Pilsbry weighed 32½ ounces.

Locality—(Exp'd '16) Zone D, Rio Gurabo at Los Quemados.

Genus ANOMIA (Linné) Müller

Anomia simplex d'Orbigny

Plate 26, Figure 15

Anomia simplex d'Orbigny, Hist. Pol. y Nat. Isla de Cuba, p. 367, 1845; pl. 28, figs. 31-33, 1855.

Anomia ephippium Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 257, 1873. Not of Linné.

We found a single right valve 40 mm. in length. Gabb also found a single specimen measuring 50 mm. The fossil appears very like the recent but, lacking the left valve, one cannot be sure of its complete identity.

Locality.—(Exp'd '16) Bluff 2, Cercado de Mao.

Genus PLACUNANOMIA Broderip

Placunanomia lithobleta Dall

Plate 34, Figures 1, 2

Placunanomia lithobleta Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 778, 1898; pt. 6, p. 1586, 1903.

We collected several specimens which accord with the description of this rare, unfigured species described from the Bowden beds, Jamaica. Our perfect shell measures 45 mm. in length, and 45 in altitude, but we have fragments of much larger shells. The surface is marked by fine, wavy, radial threads, minutely knotted or postulose; interior nacreous. This genus is now reported for the first time from Santo Domingo.

Locality.—(Exp'd '16) Guayubin to Mao road, Rio Cana.

Genus MODIOLUS Lamarck

Modiolus cercadicus, n. sp.

Plate 26, Figure 16

Shell minute, thin, fragile, translucent, with about eighteen flat, strong, slightly nodular ribs, not divaricating and with much narrower, linear, interspaces. The ribs do not extend over the anterior portion of the valve which is smooth and marked by a broad, pronounced sulcus. Greatest length 5, greatest width 4 mm.

Gabb mentions finding two minute specimens of *Modiolus* which may have been this species. We have half a dozen valves all about the same size. It is very likely immature but is well characterized by the strong sculpture. *M. Guppyi* Dall from Bowden is also small, measuring 9 mm. in length, but with more numerous ribs and characteristically feeble sculpture and the shell is not anteriorly sulcate.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Modiolus maonis, n. sp.

Plate 26, Figure 17

Shell very thin, translucent, perfectly smooth except for delicate concentric lines; outline sub-rhomboidal, hinge line rectilinear. Length 8, altitude 15, semidiameter 3 mm. This shell is of the same general type as the recent *M. tulipus* and the Miocene *inflatus*, and belongs to the section *Modiolus, sensu stricto*. No shell of its type has been reported from the blue clays of Santo Domingo or the Bowden beds of Jamaica. Although probably immature it seems best to name it, thus calling attention to the fact that we have found both smooth and ribbed representatives of the genus in the blue clays.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (A single shell).

Genus BOTULA Moerch

Botula hispaniolæ, n. sp.

Plate 35, Figure 11

Shell resembling the Oligocene to recent species *B. cinnamomea* Lamarck and the Pliocene *B. incurva* Gabb from Costa Rica but very much smaller than either and apparently distinct. All our shells are of uniform size and appear adult, they are strongly marked with irregularly spaced concentric growth lines and the surface shows very fine radial striæ. Our recent specimen of *B. cinnamomea* from the West Indies is nearly smooth, its length 33 and greatest altitude 15, being more than twice the length of our fossils. Gabb's *B. incurva* is 23 long and its beaks are more incurved than in our shells, which measure in length 16, altitude 7, diameter 9 mm.

This curious shell is quite different from any other form we collected and easily recognized by its odd shape and deeply sinuous base. It is the first *Botula* ever found in the blue clays.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito. (Quite common boring in coral).

Genus LITHOPHAGA Bolten

Lithophaga antillarum d'Orbigny

Lithodomus antillarum d'Orbigny, Hist. Pol. y Nat. Isla de Cuba, p. 351, 1845; Atlas pl. 28, figs. 12, 13, 1855.

Modiola corrugata Philippi, Abbild. und Beschr., vol. 2, p. 147, pl. 1, fig. 1, 1846.
Lithophagus corrugatus Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 253, 1873.
Lithophaga antillarum Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 799, 1898; Bull. 90, U. S. Nat. Mus., p. 129, 1915,

Our specimens are imperfect but seem to be identical with recent shells of *L. antillarum* from Guadeloupe. Dall found this species in the Tampa silex beds, Florida, and Gabb mentions its occurrence at Cevico, Santo Domingo.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito. (Boring in coral).

Lithophaga nigra d'Orbigny

Lithodomus niger d'Orbigny, De la Sagra, Hist. Pol. p Nat. Isla de Cuba, pt. 2, vol. 5, p. 351, 1845; Atlas, vol. 8, pl. 28, figs. 10, 11, 1855. (Spanish edition).
Modiola caribæa Philippi, Abbild u. Beschr., vol. 3, p. 20, pl. 2, fig. 5, 1847.
Lithophaga nigra Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 799, 1898; Bull. 90 U. S. Nat. Museum. p. 129, 1915.

We had several perfect specimens but so extremely fragile that they later fell to pieces. The hinge is toothless, and the transverse striæ terminate suddenly along an oblique line passing from the umbo backwards just as in the recent species. The shell has been found in the Tampa silex beds and is living now in the Antilles. It is now reported for the first time from the blue clays of Santo Domingo.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito (Boring in coral).

Genus CRENELLA Brown

Crenella divaricata d'Orbigny

Plate 26, Figure 18

Nuculocardia divaricata d'Orbigny, De la Sagra, Hist. Pol. y Nat. Isla de Cuba, Atlas pl. 27, figs. 56-59, 1855.
Crenella divaricata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 252, 1873.

Crenella divaricata Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 803, 1898.

This pretty little shell with its characteristic divaricating radial sculpture, also occurs in the Bowden beds and is living in the Antilles, off Panama and in the Gulf of California. Length 2.25, altitude 2.50 mm.

Locality. —(Exp'd '16) Bluff 2, Cercado de Mao.

Genus MYTILOPSIS Conrad

Mytilopsis domingensis Recluz

Plate 39, Figure 5

Dreissena domingensis Recluz, Journ. de Couch., vol. 3, pl. 10, fig. 8, p. 255, 1852.

We collected several fossil shells which resemble young specimens of *M. domingensis* from the Monte Cristi beach, but are somewhat more expanded and flattened in the posterior dorsal region, yet some of the recent shells show the same tendency and the fossil and recent appear to be the same species. The hinge of the fossil shows distinctly the characteristic supporting plate just posterior to the cardinal area. Our largest fossil is 19 in length, largest recent 33 mm. The genus is now recorded for the first time from the blue clays.

Locality. —(Exp'd '16) Sandy clays and Zone H, Rio Cana at Caimito.

ORDER ANOMALODESMACEA

Genus PANDORA Bruguière

Pandora inconspicua Gabb

Plate 26, Figures 19, 19a

Pandora inconspicua Gabb, Trans, Amer. Phil. Soc., vol. 15, p. 248, 1873.

Pandora inconspicua Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1522, 1903.

This attractive little shell has never been figured and, to add to the difficulty, according to Gabb's description its length is 0.3

inch, width one inch." The last two words must be a printer's error, for Gabb adds that it is the smallest species of *Pandora* with which he is acquainted. Our specimens seem to be what he had in mind. The convex, left valves measure 8 mm. in length and 4 in altitude, the right, flat valve is slightly smaller.

Localities—(Exp'd '16) Bluff 3 (quite common); Bluff 2 (very scarce), Cercado de Mao.

Genus CUSPIDARIA Nardo.

Cuspidaria islahispaniolæ, n. sp.

Plate 26, Figure 20

Neæra alternata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 248, 1873. Not of d'Orbigny.

Neæra ornatissima Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 530, 1876. Not of d'Orbigny.

We collected a dozen specimens of a *Cuspidaria* apparently the species which Gabb and Guppy referred to the recent, but showing constant differences as a comparison of our figure with d'Orbigny's will indicate.

Our shells are inflated anteriorly with umbones full, beaks prominent, curving; rostrum rather long, sub-truncate terminally; concentric sculpture of valves feeble; radial sculpture strong posteriorly, invariably obsolete anteriorly; there being four to six well developed radials on the posterior portion of the valves, the radial defining the commencement of the rostrum usually forming a strong carina after which the radials become progressively weaker and fade out, remaining as traces around the anterior basal region, but entirely absent from the umbones; no interradials are present; rostrum frequently smooth, sometimes marked by one or two radial threads passing from the umbo towards the base of the truncation. Length 9, altitude 6, semidiameter 3 mm.

The Bowden species *C. craspedonia* Dall is allied to our shell but half as large, with interradials, stronger concentric sculpture, and with major and minor radials which persist over the anterior portion of the shell.

Locality—(Exp'd '16) Bluff 3, Cercado de Mao.

ORDER TELEODESMACEA

Genus CORALLIOPHAGA Blainville

Coralliophaga coralliophaga Gmelin

Plate 35, Figure 12

Chama coralliophaga Chemnitz, Conch. Cab., 10, p. 359, pl. 172, figs. 1673-4, 1788.

Cypricardia Hornbeckiana d'Orbigny, De la Sagra, Hist. Pol. y Nat. Isla de Cuba, vol. 5, p. 312, 1845; Atlas, 8, pl. 26, figs. 33, 34, 1855.

Coralliophaga coralliophaga Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1498, 1903.

We obtained several perfect specimens of a very delicate and fragile shell resembling d'Orbigny's figure of *C. Hornbeckiana* which *fide* Dall is identical with Gmelin's species, *C. coralliophaga*, now living in the Antilles and occurring as a fossil in the Pliocene of Florida.

Locality.—(Exp'd' 16) Zone H, Rio Cana at Caimito. (Boring in coral).

Genus CRASSINELLA Guppy

Crassinella Guppyi Dall

Plate 26, Figure 21

Gouldia Martinicensis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 252, 1873. Not of d'Orbigny.

Crassitellites (*Crassinella*) *Guppyi* Dall, Proc. U. S. Nat. Museum, vol. 19, p. 326, pl. 30, fig. 5, 1896; Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1476, 1903.

Our shell appears a trifle less oblique and flatter than the figure of *C. Guppyi*, and is longer in proportion to its height. But as this genus shows considerable variation in form in a given species, our specimen is probably identical with the Bowden shell. Also reported from Matura, Trinidad.

Locality.—(Exp'd '16) Bluff 2, Cercado de Mao. (Rare).

Genus VENERICARDIA Lamarck

Venericardia scabricostata Guppy

Plate 33, Figure 1

Cardita scabricostata Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 293, pl. 18, fig. 10, 1866,

Cardita scabricostata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 252, 1873.

Cardita scabricostata Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 531, 1876.

Venericardia scabricostata Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, pp. 1428, 1586, 1903.

Shell suborbicular with about eighteen prominent, high ribs, nodulosely crenulated; interspaces V-shaped, narrower than the ribs; beaks high; umbones inflated. Length 21, altitude 20, diameter 17 mm.

Guppy's figure of the Jamaican type is inadequate but his description agrees with our Dominican shells.

Localities.—(Exp'd '16) Bluff 2, Cercado de Mao; Zone G, Rio Gurabo at Los Quemados; Zone I, Rio Cana at Caimito. (Common).

Venericardia islahispaniolæ

Plate 33, Figure 2

Shell sub-quadrate, beaks very far forward, dorsal and basal margins nearly parallel, posterior margin truncate; ribs twenty-four, narrow, more or less smooth on the umbonal ridge, elsewhere minutely but sharply nodulated on their crests; interspaces shallow, wider than the ribs, marked with irregular wavy growth lines. Length 23, altitude 21, diameter 18 mm.

This species is readily distinguished from *scabricostata* by its quadrate form, numerous, narrow ribs with interspaces wider and shallower.

Localities. — (Exp'd '16) Zones A, B, E, Rio Gurabo at Los Quemados.

Venericardia cerrogordensis, n. sp.

Plate 33, Figure 3

Shell sub-orbicular, somewhat compressed, posterior margin truncate; beaks very low; ornamentation of seventeen low ribs their crest strongly nodose, giving the effect of a series of minute fish vertebræ; interspaces much wider than the ribs, those on the anterior and central portions of the valve with two weak, secondary riblets or lateral keels of the main ribs, those on the posterior region with a single radial thread; all the interspaces but especially the posterior ones, strongly marked by wavy growth-lines; substance of shell so thin that the interior is fluted by the external sculpture; hinge weak; beaks rising very slightly above the hinge. Length 20, altitude 19, semidiameter 6 mm.

Distinguished by its compressed form, low beaks, low, strongly nodose ribs.

Locality.—(Exp'd '16) Cerro Gordo to Mao road, Rio Cana.

Genus CHAMA (Linné) Bruguière

Chama involuta Guppy

Plate 33, Figures 4, 5, 6

Chama involuta Guppy, Geol. Mag. London, dec. 2, vol. 1, p. 436, pl. 17, figs. 5a-c, 1874; Quart. Jour. Geol. Soc. London, vol. 32, p. 531, 1876.

Chama involuta Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, pp. 1398, 1586, 1903.

The left valve is attached, convex, beak spirally twisted, surface more or less granose, ornamented with foliaceous scales sometimes forming rows of radial spines; right, free valve, adorned with fluted, concentric lamellæ. The type is from Bowden.

Locality.—(Exp'd '16) Rio Cana, Guayubin to Mao road (common); Cerro Gordo to Mao road.

Chama caimitica, n. sp.

Plate 33, Figure 7

Shell oblong-ovate, attached by the left valve which is ornamented with conspicuous, irregular, vaulted scales, margin of valve very finely crenulate; tooth rugose; free right valve with scales similar to but often longer, more tubular or frondose than those on the left; the two valves are nearly equal in depth, both being moderately convex externally. Altitude 40, greatest width 32 mm.

Gabb referred one of his Dominican *Chamas* to *C. macerophylla* which our party collected on the Monte Cristi beach. It is sub-circular, much more frondose, and not identical with our fossil species. The latter is a trifle like *C. Broderipii* but smaller.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito.

Chama congregatoides, n. sp.

Plate 33, Figure 8

Shell heavy, solid, attached by the left valve which is subcircular in outline, rather deep, convex externally, ornamented with close, irregular, concentric lamellæ; beaks deep, turning strongly to the right and forward, very closely appressed to the cardinal region; inner margin of valve finely crenulate. Altitude of shell 31, length 30 mm.

This species resembles our specimens of the Miocene *C. congregata* Conrad and is of the same general type.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito.

Chama riocamica, n. sp.

Plate 33, Figure 9

Shell rather thin, triangular in outline; attached by the right valve which is very deep; beak directed forward and to the left, arching over the cardinal area in an *Exogyra*-like curve; teeth somewhat rugose and pustulose; inner margin of valve not crenulate; outer surface of right valve finely squamose and granulose with a few toothed scales which along the line of attachment form a conspicuous row. Altitude of valve 45, greatest width 30, greatest depth 30 mm.

This species has the characteristic habit of attaching itself by the *right* valve and the area of attachment is large. Our other *Chamas,—involuta*, *caimitica*, and *congregatoides* are all affixed by the *left* valve and the area of attachment is small.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito.

Genus ECHINOCHAMA Fischer

Echinochama antiquata Dall

Plate 33, Figure 10

Chama arcinella Moore, Quart. Jour. Geol. Soc., vol. 9, p. 130, 1853. Not of Linné.
Chama arcinella Guppy, *Id.*, vol. 22, p. 294, 1866.
Chama arcinella Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 251, 1873.
Chama arcinella Guppy, Geol. Mag. London, vol. 11, p. 442, 1874; Quart. Jour. Geol. Soc., vol. 32, p. 531, 1876.
Echinochama antiquata Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, pp. 1404, 1586, pl. 54, fig. 9, 1903.

A number of our specimens agree very well with Dr. Dall's figure of the Bowden shell. They differ markedly from the recent *E. arcinella* Linné, which is living on the Monte Cristi beach, in their less prominent ribs and the more squamose and the less spiny surface. The ribs in the fossil, ancestral, shell tend to become obsolete over the posterior slope. Four valves average 16 ribs which lie chiefly on the anterior two-thirds of the shell. Length 48, height 45, of type length 50, height 48 mm.

Locality.— (Exp'd '16) Bluff 1, Cercado de Mao. (Large, fine shells).

Echinochama antiquata variety *yaquensis*, n. var.

Plate 33, Figures 11, 12

The majority of our *Echinochamas* constitute a well marked variety differing from the typical in several respects. Fifteen valves average only six ribs each, the ribs are distinct and nearly equally spaced; the shell is smaller and the height somewhat greater than the length, which is reversed in the typical. Thus different valves of the variety measure 38 in length, 40 in height: 36×38; 35×37 mm. The variety is especially prevalent in the Gurabo clays.

Localities.—(Exp'd' 16) Base of limestone capping Zone A.

Zones A and B (Common), Rio Gurabo at Los Quemados; Bluff 1, Cercado de Mao (Rare).

Genus CODAKIA Scopoli

Codakia orbicularis Linné

Plate 35, Figure 1

Venus orbicularis Linné, Syst. Nat., ed. 10, p. 688, 1758.
Lucina tigerina Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 251, 1873. Not of Linné.
Lucina tigrina Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 530, 1876. Not of Linné.

We found a single fossil shell which appears in every respect like the young of *C. orbicularis*, on the Monte Cristi beach. Doubtless our fossil is similar to those referred by Gabb and Guppy to *C. tigerina;* but the true *tigerina* is East Indian, the West Indian analogue being *C. orbicularis*. The latter has not been heretofore definitely recorded from beds older than Pliocene; yet Dr. Dall mentions fragments resembling this shell from the white limestone of Clairmont, St. Ann's, Jamaica,—a horizon regarded by Hill as somewhat older than the Bowden.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito.

Genus LUCINA Bruguière

Lucina chrysostoma (Meuschen) Philippi

Plate 35, Figure 2

Tellina crysostoma Meuschen, Mus. Gevers., p. 482, 1787.
Lucina chrysostoma Philippi, Abb. und Beschr. Conchy., 2, p. 206, pl. 1, fig. 3, 1847.
Venus edentula Chemnitz, Conch. Cab., 7, pl. 40, figs. 427-429, 1784. Not of Linné, 1758.
Lucina edentula Reeve, Conch. Icon., Lucina, pl. 2, fig. 9, 1850.
Loripes edentula Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 251, 1873.

Our shells appear to be the recent species. The largest measures 70 mm. in length by 60 in altitude.

Localities.—(Exp'd '16) Bluff 3, Cercado de Mao; Zone H, Rio Cana.

Genus MYRTÆA Turton

Myrtæa lomasdesamba, n. sp.

Plate 35, Figure 3

Shell small, thin and delicate, greatly depressed, orbicular; slightly resembling *M. limoniana* Dall, from Bowden but more circular in outline, with the concentric lamellæ more distant, and entirely obsolete over the central part of the valve. On the umbonal ridge the concentric lamellæ become raised, forming very sharp delicate ridges; on the anterior dorsal margin they become squamose; on the posterior dorsal margin conspicuously spinose. The whole shell is sculptured with extremely fine radials seen only under the compound microscope. Right valve with a single, strong cardinal tooth; lateral teeth obsolete; ventral margin of shell smooth within. Length 5.50, altitude 5 mm. A rare, fragile and exquisite shell.

Locality.—(Exp'd '16) Samba Hills at an approximate altitude of 540 feet.

Genus PHACOIDES Blainville

Phacoides domingensis Dall

Lucina Pennsylvanica Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 292, 1866. Not of Linné.

Lucina Jamaicensis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 251, 1873. Not of Chemnitz which=*pectinatus* Gmelin.

Lucina Pennsylvania Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 530, 1876.

Phacoides domingensis Dall, Trans. Wagner Inst., vol. 3, pt. 6, pp. 1363, 1586, pl. 50, fig. 11, 1903.

This is the præcursor of the recent *P. pectinatus.* Our shell is a trifle larger than Dall's type and measures in altitude 37, diameter 22 mm. This species has been found at Ballast Point, Florida; Bowden, Jamaica; and on an island in Lake Henriquillo, southern Santo Domingo.

Locality.— (Exp'd '16) Bluff 2, Cercado de Mao.

Phacoides (*Lucinisca*) *hispaniolana*, n. sp.

Plate 35, Figure 4

Shell orbicular, slightly convex, beaks small, acute, directed forwards. The species is remarkable for its exquisite sculpture which is of the same type as that exhibited by *P. calhounsis* Dall, from the Chipola Oligocene, but more delicate, more varied and ornate. The concentric sculpture on intersecting the radial, rises into minute spinose beads. The umbo shows no radial sculpture only very close, fine, concentric lines; primary radials then appear. On the center of the valve each pair of heavier, primary, radial ribs *alternates with two finer secondary riblets* which on approaching the basal margin become subequal to the primaries. The ribs near the dorsal posterior margin are distinctly squamose. Hinge normal, with two strong lateral teeth and one cardinal tooth. Length 11.75, approximate altitude 11, semidiameter 3 mm. A rare and lovely shell.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Phacoides (*Lucinisca*) *cercadica*, n. sp.

Plate 35, Figure 5

Shell resembling *P. hispaniolana* in miniature but with a bolder sculpture; beaks and part of the umbo with only close, concentric lamellæ; radial ribs then appear; the ribs are well spaced, subequal, *with a single, finer, secondary rib* alternating with each primary pair; the intersections of the concentric and radial sculpture are beaded, and the ribs defining the umbonal ridge and anterior and posterior dorsal margins are all three squamose at the intersections. Hinge rather wide; right valve with a cardinal and two strong lateral teeth; left with two cardinals. Length of largest shell 6, altitude 5.50 mm.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (Not scarce).

Phacoides (*Miltha*) *Smithwoodwardi*, n. sp.

Plate 35, Figure 6

Shell sub-quadrilateral, flattened; beak very acute, curving over an extremely small but impressed lunule only about one millimeter in length; anterior dorsal area narrow, marked by two weak sulci; posterior area long, undulated, defined by a very sharp, narrow sulcus; surface of shell marked by very fine, close, concentric striæ and traces of faint, just perceptible, obsolete radial lines; teeth strong, normal. Length of left valve 45, altitude 50, semidiameter 6 mm

This species is apparently the ancestor of *M. caloosaënsis* Dall, from the Florida Pliocene and *M. Childreni* Gray (type of the subgenus) living in the Gulf of California. Our shell can readily be differentiated from *caloosaënsis* by the posterior dorsal area. In the Pliocene shell the area has two very sharp sulci,—one limiting, one central; while in our shell the central sulcus is represented by a broad undulation.

This is the first *Miltha* found in the Dominican blue clays. Though well represented in the Eocene the stock dwindled and there are but two living species, one, as noted above, on the Californian coast, the other off Mozambique.

I take great pleasure in naming this rare shell in honor of Dr. Smith Woodward of the British Museum, as a token of appreciation of many kindnesses.

Locality.—(Exp'd '16) Bluff 2, Cercado de Mao.

Phacoides (*Miltha*) *riocanensis*, n. sp.

Plate 35, Figure 7

Shell sub-orbicular, disciform; beak nearly central; entire surface ornamented with concentric lamellæ closely set on the umbo but becoming progressively more distant distally; between the lamellæ are weak, irregular, concentric stiræ. Length 48, altitude 48, semidiameter of right valve 7 mm.

This is a representative of the type of *Milthas* with sharp, concentric lamellation, exemplified by *M. hillsboroensis* and *disciformis* Heilprin, from the Pliocene of Florida. Our shell is closer to the former species, but differs markedly in its fewer concentric lamellæ which become more and more distant as the shell becomes adult. The interior of our shell is concealed by a hard matrix, but according to Dall, the shells of this group of *Miltha* have the major cardinal tooth deeply bifid, the posterior scar very small, and the anterior very narrow.

It is interesting that we should have found a representative of both groups of *Miltha*, though evidently they are very rare in the blue clays.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito.

Phacoides (*Parvilucina*) *yaquensis* Gabb

Plate 35, Figure 8

Lucina Yaquensis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 251, 1873.

Phacoides (*Parvilucina*) *yaquensis* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1382, 1903.

A *Parvilucina* which accords with Gabb's description of his unfigured *yaquensis* is exceedingly common at Cercado. Besides the more apparent concentric lines, some shells show a very faint radial sculpture. Dall gives 4 mm. as the length of his largest specimen from Bowden where the species also is found. Our largest is 3.50 long and 3 in altitude.

Localities—(Exp'd '16) Bluff 3, Cercado de Mao (hundreds of shell) ; Zone H, Rio Cana at Caimito (scarce).

Phacoides (*Bellucina*) *actinus* Dall

We collected four valves of a *Bellucina* either identical with or very closely allied to *P. actinus* from Bowden. Like that species our shells have about sixteen, radial, rounded riblets crossed by ridged concentric lines, and the sculpture appears precisely like Dr. Dall's figure of *actinus.* Only our valves seem slightly more excavated on the dorsal margin with the beaks sharper and more curved. This is very probably due to the fact that the umbones are all worn, the outer surface of the beaks being entirely eroded.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito.

Genus DIVARICELLA von Martens

Divaricella prevaricata, Guppy

Plate 35, Figure 10

Divaricella prevaricata Guppy, Proc. U. S. Nat. Museum, vol. 19, no. 1110, p. 327, pl. 30, fig. 4, 1896.
Divaricella prevaricata Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, pp. 1389, 1587, 1903.

Shell resembling *D. quadrisulcata* d'Orbigny, but smaller. Our largest is exactly the length of Guppy's Jamaican type, *i. e.* 8 mm., and measures 7 in altitude and 3 in semidiameter. This shell is probably what Gabb referred to *Lucina dentata* Wood.

Localities.—(Exp'd '16) Bluff 3, Cercado de Mao; Zone I, Rio Cana at Caimito; Zone G, Rio Gurabo at Los Quemados. (Rather abundant).

Genus DIPLODONTA Brown

Diplodonta capuloides Gabb

Plate 39, Figure 1

Mysia capuloides Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 252, 1873.
Diplodonta capuloides Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 5, pp. 1182, 1183, 1900.

Shell thin, globose, of the same type as the Eocene *D. turgida*; beaks small; umbones enormous. Largest shell 4.50 in length, altitude 4.50, semidiameter 2.25 mm. Our species appears identical with Gabb's unfigured *D. capuloides*, described from Santo Domingo and also found at Bowden.

Locality—(Exp'd '16) Bluff 3, Cercado de Mao.

Diplodonta puncturella Dall

Diplodonta (*Phlyctiderma*) *puncturella* Dall, Trans. Wagner Inst Sci., vol. 3, pt. 5, p. 1183, pl. 45, fig. 26. 1900.

Our specimens are precisely like Dr. Dall's beautifully drawn figure of this Bowden species, agreeing in the minutest details of the hinge. Length of largest shell 6.25, altitude 6, semidiameter 2 mm. The majority are smaller. Species still living.

Gabb's Dominican *D. subquadrata* 1873, was preoccupied by

Carpenter 1855, and renamed *Gabbi* by Dall in 1900. This species has never been figured but the description sounds like our shell except Gabb says it is smooth while ours is minutely punctate. We have no metatypes of Gabb's for comparison but should the two species prove identical *puncturella* has precedence.

Localities.—(Exp'd '16) Bluff 3, Cercado de Mao; Zone I, Rio Cana at Caimito.

Genus MONTACUTA Turton

Montacuta cercadica, n. sp.

Plate 39, Figure 2

Shell very inequilateral, with the general form of *M. actinophora* Dall from the Oligocene of Oak Grove, Florida; but with the posterior, shorter end more evenly rounded; the anterior, longer and more pointed; and the shell decidedly inflated, not at all compressed. Substance of shell thin and fragile, translucent; surface marked only by delicate, irregularly spaced concentric striations; hinge delicate with a rather strong cardinal "hook." Length 6.60, altitude 5.50, semidiameter 1.50 mm. This genus has never before been found in the blue clays of Santo Domingo, nor is it known at Bowden.

Locality.—(Exp'd' 16) Bluff 3, Cercado de Mao.

Montacuta maoica, n. sp.

Plate 39, Figure 3

Shell fragile, very inequilateral, resembling in form *M. chipolana* Dall, from the Oligocene of Florida, and closely related to that species. Our fossil is, however, thinner, somewhat more inflared, and the sculpture of delicate concentric lines is more elegant; the umbones are nearly smooth but the concentric lines elsewhere are raised and sharp. The hinge characters are like those of *M. chipolana*. Length of largest shell 9.50, altitude 6, semidiameter 2 mm. A smaller shell measures 7.10×4.50×1.50.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Montacuta hispaniolæ, n. sp.

Plate 39, Figure 4

Shell thin, inequilateral, but not so strikingly so as the two preceding species, and at once differentiated from them by its depressed form; anterior end somewhat longer than the posterior and both extremities evenly rounded; beaks low, inconspicuous, acute; a faint, broad, medial sulcus passes from the umbones to the ventral margin; surface with regularly spaced, elevated, concentric lines becoming obsolete and irregular towards the ventral margin; nearly the entire surface is covered with faint, radiating striæ; hinge very delicate with a feeble cardinal and no lateral teeth. Length of shell 7.25, altitude 5, semidiameter .75 mm.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Genus CARDIUM Linné

Cardium (*Trachycardium*) *dominicanum* Dall

Plate 36, Figure 1

Cardium sub-elongatum Gabb (in part), Trans. Amer. Phil. Soc., vol. 15, p. 250, 1873. Not of Sowerby, 1840.

Cardium (*Trachycardium*) *dominicanum* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 5, p. 1082, 1900.

Cardium (*Trachycardium*) *dominicanum* Brown and Pilsbry, Proc. Acad. Nat. Sci. Phila., p. 367, 1911.

We collected quantities of this species which answers in every respect to Dr. Dall's figure and description. It was also collected by Powell near Gatun on the line of the Panama Canal.

Locality.—(Exp'd '16) Bluff 3 (very abundant), Bluff 2 (very scarce), Cercado de Mao.

Cardium (*Trachycardium*) *lingua-tigris*, n. sp.

Plate 36, Figure 2

Cf. *Cardium lingua-leonis* Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 531, 1876.

Not *Cardium lingua-leonis* Guppy. *Id.* vol. 22, p. 293, pl. 18, fig. 7, 1866.

Shell with the general aspect of Guppy's Jamaican *C. lingua-leonis* but differing in the following repects: (1) the ribs in the Jamaican shell number 32, in the Dominican 42; (2) in the former the ribs are sharp and surmounted by a distinct keel with rippled edges, in the latter the ribs are broad, flat and smooth over all the central part of the valve and there is no keel apparent; (3) the beaks of the Jamaican shells are full and high, while those of the Dominican species are exceedingly low.

The ribs on the anterior slope are faint and finely, transversely rippled with growth lines. The last eight ribs on the posterior slope have a row of pustules along their posterior edge, the pustules being very minute except on the last two ribs. The posterior margin of the valve is deeply serrate; lateral teeth strong. Greatest breadth 45, thickness of one valve 13 mm.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito.

Cardium (*Trachycardium*) *tintinnabularum*, n. sp.

Plate 36, Figure 3

Shell rounded, rather thin and delicate, remarkable for its beautiful and curious ornamentation; valves sculptured with many regular fine ribs which in seven shells average forty-four; the ribs over the anterior portion are adorned with what resemble rows of miniature pendant sleigh bells which arise from the anterior edges but hang over upon the crests of the ribs, on the center of the valve the bells give place to small spines which first arise from the crest of the ribs but gradually are shifted to the posterior edges and finally come to lie in the interspaces. The spines at first small and erect become curved and bean-shaped on the posterior slope of the shell. Inner margin of valves serrate, teeth sharply defined. Altitude of largest valve 20, width 20, thickness 7.25; a shell with both valves still together measures 18 × 18 × 14 mm.

Locality.—(Exp'd '16) Gravels and Zone H, Rio Cana at Caimito; Bluff 3, Cercado de Mao.

Cardium (*Trachycardium*) *Cinderellæ*, n. sp.

Plate 36, Figure 4

Shell sub-circular in outline, thin, rather fragile; sculpture of forty-four ribs distally channelled, adorned with close-set, conspicuous, spinose vaulted scales; interspaces very narrow, grooved, marked by microscopic, regular transverse striæ. Length 25.5, altitude 26, thickness of one valve 10 mm. A member of the *Cardium muricatum* group.

This handsome shell is very rare.

Locality.—(Exp'd' 16) Zone B, Rio Gurabo at Los Quemados.

Cardium (*Trigonicardia*) *haitense* Sowerby

Plate 36, Figures 5, 5a

Cardium Haitense Sowerby, Quart. Jour. Geol. Soc. London, vol. 6, p. 52, pl. 10, fig. 11, 1849.

Cardium Haitense Guppy, *Id.*, vol. 22, p. 293, 1866.

Cardium (*Fragum*) *Haitense* Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 251, 1873.

Cardium haitense Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 531, 1876.

Cardium (*Trigoniocardia*) *haitense* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 5, pp. 1103, 1105, 1900.

Our specimens are divisible into two groups both with typically ten ribs on the truncation and fourteen on the body. (1) Shells with the posterior slope from the beak to the margin roundly angulated, outline subquadrate; (2) shells with the posterior slope very sharply angulate and the posterior margin correspondingly produced. Sowerby's figures indicate that he confused these two forms in *C. haitense*. His upper figure (of the exterior) agrees with his description that the slope is roundly angulated, while the lower figure (of an interior) is evidently the angulated shell with the posterior margin produced. The writer would suggest restricting the true *C. haitense* to the first form and calling the second by a varietal name, as indicated below, since they seem to intergrade. *C. haitense* has also been reported from Cumana and Bowden.

Localities.—(Exp'd '16) Bluffs 2 and 3, Cercado de Mao; Zone G, Rio Gurabo; Zone I, Rio Cana.

Cardium (*Trigoniocardia*) *haitense* variety *cercadicum*, n. var.

Plate 36, Figure 6

As noted above, this form differs from the typical in its sharply angulated posterior slope and produced posterior margin. Ribs usually ten on the truncation, fourteen on the body, ornamented with nodules pointing upwards. Several shells measure as follows: altitude 17, length 14, diameter 12; 15×14×11; 12×11×8 mm.

Locality.—(Exp'd '16) Bluff 2 (common), Cercado de Mao.

Cardium (*Trigoniocardia*) *aminense* Dall

Cardium (*Trigoniocardia*) *aminense* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 5, p. 1104, 1900; pt. 6, pl. 48, fig. 11, 1903.

This high, narrow species measures in altitude 14, length 9.5, diameter 12 mm. Body with ten to eleven high, flat ribs, their wedge-shaped nodules pointing downwards; truncation with ten riblets with tear-shaped nodules.

Type locality Potrero, Rio Amina.

Cardium (*Trigoniocardia*) *sambaicum*, n. sp.

Plate 36, Figure 7

Shell sub-quadrate, rather thin, anterior margin roundly truncate, posterior truncate, base rounded; umbonal slope roundly angulated; inner margin deeply serrate; ribs on the body seventeen, on the truncation ten, ribs with only a few nodules preserved but showing definite marks of having been all nodose; interspaces narrower than the ribs, marked strongly by transverse growth lines. Altitude 17, length 17, diameter 14 mm.

This species resembles *haitense* but is squarer and has more ribs.

Locality.—(Exp'd '16) Samba Hills at an approximate altitue of 540 feet.

Cardium (*Lævicardium*) *serratum* Linné

Plate 36, Figure 8

Cardium serratum Linné, Syst. Nat., ed. 19, p. 680, 1758.

Cardium lævigatum Lamarck, An. s. Vert., 6, pt. 1, p. 11, 1819. Not of Born nor of Linné.

Cardium (*Lævicardium*) *serratum* Dall (in part), Trans. Wagner Inst. Sci., vol. 3, pt. 5, p. 1110, 1900.

Cardium (*Lævicardium*) *serratum* Brown and Pilsbry. Proc. Acad. Nat. Sci. Phila., p. 367, 1911.

Certain of our fossil *Lævicardia* seem identical with specimens of *serratum* living on the Monte Cristi beach. This species is common in the Miocene-Recent faunas and also occurs at Bowden and Gatun.

Localities.—Exp'd '16) Zones E, F, G, Rio Gurabo at Los Quemados; Bluff 1, Cercado de Mao; Samba Hills, approximate altitude 540 feet.

Cardium (*Lævicardium*) *venustum* Gabb

Plate 36, Figure 9

Cardium venustum Gabb, Trans, Amer. Phil. Soc., vol. 15, p. 251, 1873.

Cardium (*Lævicardium*) *serratum* Dall (in part), Trans. Wagner Inst. Sci., vol.3, pt. 5, p. 1110, 1900.

A number of our fossils differ somewhat in form from typical *serratum*, the ribbing is more distinct and the umbones fuller. They correspond to Gabb's description of his unfigured *C. venustum*. Dr. Dall united *venustum* with *serratum* and it may be that a larger series would show this to be true. I simply indicate the difference exhibited by shells in our collection.

Locality. —(Exp'd '16) Bluffs 2 and 3, Cercado de Mao.

Genus PROTOCARDIA Beyrich

Protocardia gurabica, n. sp.

Plate 36, Figure 10

Shell resembling the Vicksburgian Oligocene *P. diversa* Conrad, but differing in the following respects:— (1) the posterior sculpture in *diversa* consists of about twenty to twenty-five very sharply defined, highly raised, radiating threads with wider interspaces; in our fossil there are about forty-three crowded, flattened, slightly wavy threads with interspaces much narrower, reduced to mere lines; (2) in *diversa* the ending of the posterior sculpture is defined simply by a slightly heavier radiating thread in our shell its termination is defined by a fine but sharp carination extending from the umbonal region to the base, the posterior slope of this carination forming a smooth band marked only at frequent intervals by fine, oblique raised growth-striæ; (3) the posterior region is very slightly undulate in *diversa* but markedly so in our fossil, there being two sulci with a fold between; (4) the sculpture over the central part of our shell is much finer and more delicate, consisting of fine radial and concentric lines; and anteriorly the concentric lines are sharper than in *diversa*. Length 24, approximate altitude 21, diameter 18 mm.

Our single specimen though imperfect has seemed worth describing as it is the first *Protoçardia* ever found in the Dominican blue clays.

Locality.—(Exp'd' 16) Zone G, Rio Gurabo at Los Quemados (very rare).

Protocardia islahispaniolæ, n. sp.

Plate 36, Figure 11

Shell markedly resembling the recent deep sea Antillean *P. peramabilis* Dall and, to a less degree, the allied Bowden *P. jamaicensis* Dall; but nearly twice the size of the first and four times that of the second, and more excavated posteriorly than either. Posterior sculpture extending over more than a third of the shell, terminated by a slightly thicker radiating riblet and consisting of very narrow riblets, three to every millemeter, alternating with wider interspaces which are either transversely or obliquely cross-barred with fine lamellæ, those obliquely barred intervening between one or generally two straight-barred spaces. For a distance of about five millemeters from the posterior margin the riblets cease and the surface is smooth except for three rather distant impressed, punctate lines. Near the anterior border of the posterior sculpture several rows of very minute prickles remain, evidently the remnants of many which once ornamented the shell and have been abraded. The few which remain all *arise from the obliquely-barred interspaces.* The anterior central portion of the shell is sculptured with stronger radiating and feebler concentric threads. The latter gradually strengthen anteriorly, where they form a network with the radiating threads, every intersection being knotted. The shell is exceedingly thin and fragile and cannot be removed from the matrix to examine the interior. Length 23, altitude 22, approximate semidiameter 7.5 mm.

It is curious that the Gurabo bluffs should have yielded two species of this genus, rare at such horizons;—one akin to the Vicksburgian and the other apparently the ancestor of the living deep sea species.

Locality.—(Exp'd '16) Zone B, Rio Gurabo at Los Quemados.

Genus PITARIA Roemer

Pitaria (*Lamelliconcha*) *circinata* Born

Plate 37, Figure 1

Venus circinata Born, Test. Mus. Vind., p. 61, pl. 4, fig. 8, 1780.

Cytherea juncea Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 682, pl. 26, fig. 13, 1866.

Chione circinata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 250, 1873.

Cytherea juncea Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 531, 1876.

Pitaria (*Lamelliconcha*) *circinata* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1269, 1903.

Fide Dall, Guppy's Cumana type of *juncea* is identical with the recent *circinata*; and on comparing our specimens from the blue clays of the river bluffs with those from the beach at Monte Cristi no constant differences are discernible. The shell is also found at Gatun and is living on both coasts of Central America and in the Antilles. It is at once differentiated from our other Dominican species by its single, sharp, intermediate thread between every two lamellæ. This alternation is more marked in our fossil than in our recent shells. Length 34, altitude 29, semidiameter 9 mm.

Localities.— (Exp'd '16) Zones H and I, Rio Cana at Caimito.

Pitaria acuticostata Gabb

Plate 37, Figure 2

Callista acuticostata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 250 1873.

We collected a large number of shells, mostly young, which answer to Gabb's description of this unfigured species. They resemble young shells of *P. circinata*, but are flatter and *the lamellæ are all equal*, there being no intermediate thread. Length of largest shell 11, altitude 17, semidiameter 6¾ mm.

Localities.—(Exp'd '16) Zone G, Rio Gurabo at Los Quemados.

Pitaria carbasea Guppy

Cytherea (*Circe*) *carbasea* Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 292, fig. 13, 1866.

Callista Carbasea Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 250, 1873.

Piteria (*Hyphantosoma*) *carbasea* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1266, 1903.

This species was described from a Jamaican fossil and later found by Gabb in Santo Domingo. We have no representatives of this shell and it is here simply mentioned as an authentic figured, species likely to be found in Dominican collections.

Pitaria cercadica, n. sp.

Plate 37, Figure 10

Shell, rounded, inflated, umbones full, beaks incurved; lunule marked off by a single line hardly breaking the concentric sculpture; escutcheon not defined; umbonal region of both our shells smooth, perhaps worn so, entire remaining surface sculptured with close, fine, apparently uniform flattened ridges, but when examined with a lens they are seen to be somewhat irregular and occasionally divaricating; only one imperfect hinge is free from the matrix but it appears to be that of *Pitaria*. Our shell shows no radial sculpture whatever. Length 30, approximate altitude 25, semidiameter 10 mm.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Pitaria planivieta Guppy

Cytherea (*Callista*) *planivieta* Guppy, Quart. Jour. Geol. Soc. London vol. 22, p. 292, pl. 18, fig. 3. 1866.

Callista planivieta Gabb, Trans, Amer. Phil. Soc., vol. 15, p. 250, 1873.

Cytherea planivieta Guppy, Quart. Jour Geol. Soc. London, vol. 32 p. 531, 1876.

Pitaria (*Lamelliconcha*) *planivieta* Dall, Trans. Wagner Inst. Sci., vol 3, pt. 6, p. 1268, 1903.

Guppy's figure exaggerates the slight irregularity of the concentric ribbing,—as he later wrote, the type was somewhat distorted. Well preserved shells are polished with flat, close ribs and very narrow, almost linear interspaces. Bowden is the type locality. Dall has identified, somewhat doubtfully, imperfect specimens from White Beach, near Osprey, Florida as this species.

Localities.—(Exp'd' 16) Bluffs 2 and 3, Cercado de Mao; Zone G, Rio Gurabo at Los Quemados; Zone I, Rio Cana at Caimito.

Genus ANTIGONA Schumacher

Antigona tarquinia Dall

Plate 37, Figure 4

Venus magnifica Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 249' 1873. Not of Sowerby 1853.

Cytherea tarquinia Dall, Trans. Wagner Inst., vol. 3, pt. 6, p. 1274, pl. 38, figs. 2, 2a, 1903.

Antigona tarquinia Dall, Bull. 90, U. S. Nat. Museum, p 147, 1915.

Our shell resembles Dr. Dall's figures of *A. tarquinia* from the Ballast Point silex beds; but its posterior dorsal margin is very much more sloping. More material may prove the Dominican shell to be of varietal rank. Length 36, altitude 33, semidiameter 10 mm.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito.

Antigona (*Ventricola*) *Blandiana* Guppy

Plate 37, Figure 5

Venus Blandiana Guppy, Geol. Mag. London, p. 436, pl. 17, fig. 8, 1874; Quart. Jour. Geol. Soc. London, vol. 32, p. 530, 1876.

Cytherea (*Ventricola*) *Blandiana* Dall. Trans. Wagner Inst. Sci., vol. 3, pt. 6, pp. 1277, 1587, 1900.

Larger and finer than specimens from Jamaica which is the type locality, but apparently the same species. Readily recognized by the elegant sculpture of equidistant, concentric lamellæ between each of which are groups of concentric threads. Guppy's type had seven or eight threads in every group, ours rarely show as many and only over the umbones, usually there are about four to a group. Our largest shell measures in length 41, altitude 36, diameter 25 mm.

Localities. — (Exp'd '16) Bluff 1, Cercado de Mao; Zones A, B, F, Rio Gurabo at Los Quemados; Guayubin to Mao road, Rio Cana.

Genus CHIONE Megerle von Mühlfeldt

Chione Woodwardi Guppy

Plate 37, Figure 6

Venus Woodwardi Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 292, pl. 18, fig. 1, 1866; *Id.*, vol. 32, p. 530, 1876.

First described from Jamaica but also common in Santo Domingo, our specimens according in every respect with Guppy's description. The recent Antillean analogue of this beautifully sculptured shell is *C. cancellata* Linné.

Localities.— (Exp'd '16) Bluffs 2 and 3, Cercado de Mao; Zone G, Rio Gurabo at Los Quemados; Zone I, Rio Cana at Caimito.

Chione cf. Walli Guppy

Plate 37, Figure 7

Venus Walli Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 581, pl. 26, fig. 16, 1866.

Chione Walli Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, pp. 1291, 1587, 1903.

Among our Chiones are several which differ from *C. Woodwardi* in their somewhat larger size, and in the *distinct doubling of the ribs upon the disc.* The latter feature is characteristic of *C. Walli,* described by Guppy from the Manzanilla beds of Trinidad and also found at Bowden but not as yet reported from

Santo Domingo. That species however, has an intermediate rib between every pair but of these secondary ribs a few only appear on our shell. As occasionally a rib doubles in *Woodwardi* our shell may be a mutation of that species with this tendency greatly increased.

Locality.— (Exp'd '16) Bluffs 2 and 3, Cercado de Mao.

Chione (*Lirophora*) *Hendersoni* Dall

Plate 37, Figure 8

Venus paphia Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 292, 1866. Not of Linné.

Chione paphia Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 249, 1873.

Venus paphia Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 292, 1876.

Chione (*Liophora*) *Hendersonii* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1295, pl. 55, fig. 22, 1903.

The Bowden shells are described as having about fifteen ribs, sometimes so close together as to obscure the interspaces. Our Dominican specimens show variation in the number of ribs and they are not so crowded. The most closely sculptured shells have about eleven large ribs and three to five small ones on the beaks. Others have only six or eight large ribs. This difference leads one to conclude that the ribbing is inconstant and that probably our shells are the same species as the Jamaican.

Localities—(Exp'd '16) Bluff 1, Cercado de Mao; Zone G, Rio Gurabo at Los Quemados; Zone I, Rio Cana at Caimito.

Genus PETRICOLA Lamarck

Petricola caimitica, n. sp.

Plate 37, Figure 11

Shell, rounded, convex, rather thin, gaping posteriorly; sculptured with occasional concentric ridges and characterized by the surprising and varied radial sculpture. On the umbonal region the radials anastomose forming series of very narrow, elongated V-shaped designs, the apices extending downwards; after a distance of about seven millemeters from the beaks the radials suddenly become coarser, more distant, more oblique and irregular, on the face of one valve breaking up to form a series of large Vs with apices directed upwards. The sculpture is strongest on the central part of the valves and is weaker posteriorly. Cardinal teeth in the left valve two, the anterior strongly bifid. Length 14, altitude 13, semidiameter 4 mm. The first *Petricola* ever found in the Santo Domingo blue clays.

Locality. — (Exp'd '16) Zone H, Rio Cana at Caimito. (Boring in coral).

Petricola (*Rupellaria*) *riocanensis*, n. sp.

Plate 37, Figure 12

Shell ovate, convex, inflated ; very short and rounded anteriorly, produced and bluntly pointed posteriorly ; radially sculptured with somewhat irregular, sharp ridges which are interrupted and rendered more or less discontinuous by the thickened concentric resting stages. This species resembles *P. typica* Jonas now living in the Antilles and found in the Florida Pliocene, but differs in the following respects:— (1)the fossil is shorter anteriorly ; (2) less produced posteriorly ; (3) the beak is more anterior ; (4) the sculpture more uniform over the shell ; (5) the hinge is weaker. These differences are constant in all our specimens. Length 21, altitude 17, semidiameter 8 mm.

A recent shell in the Newcomb collection labelled *P. robusta* Sowerby from the Gulf of California is the Pacific analogue of our fossil.

Locality.— (Exp'd '16) Zone H, Rio Cana at Caimito. (Boring in coral).

Genus TELLINA Linné

Tellina riocanensis, n. sp.

Plate 38, Figure 3

Shell polished, shining, somewhat inequivalve, the right valve being more compressed than the left, the difference in diameter averaging a millemeter ; left valve gently convex ; the valves are also discrepantly sculptured, the sculpture of the right being stronger. The ornamentation consists of fine, close, flattened ridges, as in *T. punicea* and *alternata*, but very much feebler. On the right valve the ridges extend over the shell as far as the anterior edge of the umbonal ridge where they end, only a few being continued as raised concentric threads. On the left valve the concentric ridges are present only on the anterior end then fade out, so that the central and posterior portions of the shell are smooth except for very fine concentric growth-lines. Both valves show in certain lights faint, obsolete radial striæ ; both valves show a distinct anterior and posterior sulcus, the former near the anterior dorsal margin, the latter on the umbonal ridge. Interior of valves with a radial rib just behind the anterior adductor scar ; cardinal and lateral teeth very strong in the right valve, the anterior lateral especially conspicuous, posterior cardinal tooth bifid ; teeth of the left valve weaker or obsolete ; pallial sinus very deep, extending to the anterior adductor scar. Length of average sized shell 41, altitude 22, diameter 9, that of the left valve being 5, that of the right 4 mm. This pretty species is referable to the section *Eurytellina*.

Localities. — (Exp'd '16) Zone H (abundant), Zone I (scarce), Rio Cana at Caimito.

Tellina islahisapaniolæ, n. sp.

Plate 38, Figure 6

We collected two right valves of a very delicate, fragile *Tellina* at once differentiated by its exquisite microscopic sculpture. The left valve is as yet unknown. Right valve oblong, greatly compressed, umbonal ridge angulated, with a broad sulcus behind, rendering the posterior margin of the shell arcuate ; concentric sculpture of extremely fine, close, rounded threads extending to the umbonal ridge where they are replaced by less regular, arcuate growth-lines continuing to the dorsal margin ; radial sculpture of fine incised lines absent from the posterior dorsal region, commencing just anterior to the umbonal ridge ; for some distance they are close set and regularly spaced, cutting the concentric thread into rectangular blocks, but towards the center of the valve and anteriorly the radii become more distant, irregularly spaced and present only near the basal margin, obsolete proximally ; pallial sinus very deep, extending nearly to the anterior scar ; shell strengthened by an oblique internal ray just posterior to the anterior scar ; teeth delicate but sharp. Length of largest valve 43, altitude 24, semidiameter 3 mm.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (Scarce).

Tellina Waylandvaughani, n. sp.

Plate 38, Figures 7, 8

Shell ovate, porcellanous, rounded anteriorly, pointed but not produced posteriorly ; beaks low, sub-central ; posterior dorsal margin sloping steeply forming a sharp angle with the base ; basal margin sinuous, centrally inflected ; valves discrepant in form and sculpture ; left valve gently convex, evenly, very finely, concentrically grooved, the groovings fading on reaching the umbonal ridge and represented thereafter by concentric growth-lines ; right valve compressed centrally ; sculptured anteriorly and centrally with concentric groovings similar to those of the left valve but a trifle stronger ; on approaching the umbonal ridge and thereafter the sculpture suddenly grows bolder, the groovings deepening so as to place the intervening ridges in quite high relief ; in certain lights faint traces can be seen on both valves of obsolete radial striæ, especially on the anterior half of the shell; pallial sinus deep, reaching almost to the anterior muscle scar ; our single shell is thickened internally in the umbonal region appearing somewhat pathologic ; each valve is strengthened by a very strong, anterior, internal ray and a feeble posterior one. Length 45, altitude 24, diameter 11 mm.

This, our handsomest *Tellina* is named in honor of Dr. T. Wayland Vaughan, as a token of friendship and appreciation of his very great kindness in obtaining for us reports on our *Foraminifera*, *Bryozoa*, *Echinoderms* and *Crustacea* and himself writing a very valuable and beautiful report on our *Corals*.

Locality.—(Exp'd' 16) Zone G, Rio Gurabo at Los Quemados.

Tellina maoica, n. sp.

Plate 38, Figure 5

We collected four right valves of a *Tellina* distinguished from the others of equal size by its very smooth surface marked only by fine, irregularly spaced growth-lines; in certain lights the faintest radial striations can be detected; instead of a sulcus the posterior dorsal slope has a low fold extending to the umbonal ridge; interior of valve concealed by the matrix; left valve unknown. Length of right valve 44, altitude 25, semidiameter 4 mm.

This, like our other larger *Tellinæ*, is quite unlike any species described from Bowden; while *T. minuta* Gabb is the only member of the genus heretofore described from the Santo Domingo Tertiary beds.

Locality.—(Exp'd '16) Bluff 3, Cercado de Maò.

Tellina cibaoica, n. sp.

Plate 38, Figure 10

Shell rather small, thin, very highly polished; shallowly sulcate posteriorly; valves similar except that the right is slightly more sharply lined and has the two strong lateral teeth which are lacking in the left, as is characteristic of the section *Eurytellina*. Surface of the valves marked only by fine, microscopic, impressed lines obsolete posteriorly; traces of very faint, close radial striæ can be seen in certain lights under a lens. Length 25, altitude 15.5, diameter 6 mm.

Localities.— (Exp'd '16) Zone H, Rio Cana at Caimito. (Rare).

Tellina (*Merisca*) *crystallina* Chemnitz

Plate 38, Figure 4

Tellina crystallina Chemnitz, vol. 11, p. 210, figs. 1947, 1948.
Tellidora crystallina Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 249, 1873.

This striking and exquisitely sculptured shell is the type of the section *Merisca*. We obtained quite a quantity of specimens from the Monte Cristi beach, among which are some identical in every respect with our fossils from the bluffs.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (Rather rare).

Tellina (*Merisca*) *Sancti-Dominici*, n. sp.

Plate 38, Figure 11

Shell small, ovate, with two distinct posterior sulci and corresponding folds between: valves somewhat discrepant in form, the right being a trifle more inflated, appearing shorter and higher and the left being a little more strongly sculptured. The surface is ornamented with fine, ridged, concentric lamellæ, appearing under a lens very delicate, sharp and frosty; right hinge with distinct fine laterals, lacking in the left. Length 11, altitude 8, diameter 4 mm.

Locality—(Exp'd '16) Bluff 3, Cercado de Mao.

Tellina (*Scissula*) *cercadica*, n. sp.

Plate 38, Figure 9

Shell very thin and delicate, oblong, beaks nearly central, low; anterior and basal margins rounded, posterior truncate; umbonal ridge angulated distinctly but not sharply; surface with fine concentric lines of growth, strongest posteriorly, and with very beautiful, regularly spaced, ornamental striæ which anteriorly are concentric, soon become oblique, sloping downwards at variance with the growth-lines, then suddenly end after crossing the center of the valve and on approaching the umbonal ridge; the sculpture of the right and left valve is similar; hinge teeth delicate but distinct; no internal strengthening rays are present. Length 26, altitude 18, semidiameter 3 mm.

This pretty species is strikingly like specimens in the Newcomb collection labelled *T. delicatula* Deshayes from Panama and from the Gulf of California. Our fossils undoubtedly represent the ancestral stock of this recent West Coast shell.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (Abundant).

Tellina (*Scissula*) *scitula* Dall

Plate 38, Figure 12

Tellina (*Scissula*) *scitula* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 5, p. 1028, 1900.

Shell small, rounded anteriorly, moderately pointed posteriorly; surface with fine, close striæ, extending obliquely backward towards the base, and faint microscopic radial striations; no interior thickened rays. Length of a large shell 8, altitude 4.50, diameter 1.5 mm. The majority are about 7 mm. long. Resembling *T. iris* Say, but with finer, closer, more oblique striæ and more pointed posterior end. Described from Santo Domingo and Bowden.

We found this pretty little Tellina exceedingly abundant on the Mao.

Localities.—Exp'd '16) Bluff 3, Cercado de Mao (thousands of shells); Zone H, Rio Cana at Caimito (scarce); Zone G, Rio Gurabo at Los Quemados (compararively scarce).

Genus STRIGILLA Turton

Strigilla pisiformis Linné

Plate 39, Figure 6

Tellina pisiformis Linné, Syst. Nat., ed. 10, p. 677, 1758.

Strigilta pisiformis Gabb, Trans, Amer. Phil. Soc., vol. 15, p. 249, 1873.

Strigilla pisiformis Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 5, p. 1038, 1900.

We obtained hundreds of young shells of this species from the river bluffs which seem identical with those from the Monte Cristi beach. The latter, however, are prettily stained on the center of the disc with brilliant rose pink.

Locality. —(Exp'd '16) Bluff 3, Cercado de Mao.

Strigilla caimitica, n. sp.

Plate 39, Figure 7

We collected a single valve of a *Strigilla* so exquisitely sculptured that although imperfect it seems worthy of description. The shell is broadly ovate, slightly produced in form, ornamented by three diverse sets of impressed lines. The first consists of a series of parallel sharply ridged, undulating, or ziczac lines with a general concentric trend ; the second which decorates the center of the valve consists of steeply oblique, parallel impressed lines ; the third set which covers the produced portion of the valve consists of fine, distinct striæ which are concentric near the dorsal margin of the shell but suddenly alter their direction so as to be nearly vertical. Length 16, approximate altitude 14, semidiameter 3 mm.

Locality—(Exp'd '16) Zone H, Rio Cana at Caimito.

Genus METIS H. and A. Adams

Metis trinitaria Dall

Metis trinitaria Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 5, pp. 1041, pl. 46, fig. 24, 1900.

Cf. *Tellina biplicata* Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 530, 1876. Not of Conrad.

Probably the shell in the Heneken collection referred by Guppy to *T. biplicata* should be classed as this species. We did not collect any shells of this type but they are to be looked for in Dominican collections. The species is reported by Dall from the Caroni series of Trinidad and near Santiago de Cuba.. It is recognized by its rounded, *produced* anterior end and very short, sharply folded posterior end. Length 52, altitude 41, diameter 19, but it may attain twice these measurements.

Genus MACOMA Leach

Macoma cf. *constricta* Bruguière

Solen constrictus Bruguière, Mém. Soc. Hist. Nat., vol. 1, p. 126, no. 3, 1799.

Tellina (*Macoma*) *constricta* Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 249, 1873.

Macoma constricta Dall, Trans. Wagner Inst., vol. 3, pt. 5, p. 1050, 1900.

We collected a fragmentary fossil shell, probably similar to that which Gabb obtained and referred to *M. constricta*. Our specimen is imperfect and we lack shells of *constricta* for comparison; but while it is of the same general type it is very doubtful if the fossil is really identical with *constricta*.

Locality.—(Exp'd '16) Zone I, Rio Cana at Caimito.

Macoma (*Psammacoma*) *yaquensis*, n. sp.

Plate 39, Figure 8

Shell rather small, thin, compressed, beaks low, pointed; anterior end longer than the posterior, rounded; posterior end feebly angulated, bluntly terminated; surface smooth except for fine growth-lines; cardinal teeth sharp, hinge delicate. Length 17.5, altitude 9.5, semidiameter 1.5 mm. This species is is nearest to *M. tracta* Dall from Chipola, Florida and Bowden, but is nearly a third larger and differs somewhat in form.

Locality. —(Exp'd '16) Bluff 3 Cercado de Mao.

Macoma (*Cymatoica*) *hispaniolæ*, n. sp.

Plate 39, Figure 9

Shell small, inequivalve, rostrate and gaping posteriorly; rounded and gently convex anteriorly; left valve slightly shorter than the right, hardly sulcate posteriorly, shortly rostrate, markedly truncate; right valve strikingly rostrate and flexuous posteriorly; both valves with feeble, irregular concentric sculpture except on the posterior part of the right valve where there are about eight short, crested waves. Length 10, altitude 5.50, semidiameter 1.50 mm. The species most resembling our shell is *M. Vendryesi* Dall from Bowden.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Genus SEMELE Schumacher

Semele Claytoni, n. sp.

Plate 35, Figure 9

Shell very large and fine, of the same general type as *S. perlamellosa* Heilprin and *S. Leana* Dall, and in outline somewhat intermediate between these species. It is less elliptical and proportionally higher than Heilprin's figure of the type of *perlamellosa*, with more prominent beaks. The umbonal ridge is slightly curving resembling that of *S. Leana*; the entire surface is ornamented with very regular sharp, concentric lamellæ, on the center of the disc there are about eight to every ten millemeters while in *perlamellosa* there are about ten; radial striæ very faint, much closer than in *perlamellosa*. Length 66, altitude 55, semidiameter 9 mm. The interior of the valve is concealed by a hard matrix.

This very beautiful shell is the first of the genus ever found in the Santo Domingo blue clays though Gabb reported *S. variegata* Lamarck from the Post Pliocene Coast limestone at Macoris. Our shell is named in honor of Mr. H. H. Clayton of the Meteorological Bureau, Buenos Aires, as a token of highest regard and friendship.

Localities.—(Exp'd '16) Zone I, Rio Cana at Caimito; Bluff 2, Cercado de Mao.

Genus PSAMMOSOLEN Risso

Psammosolen Sancti-Dominici, n. sp.

Plate 37, Figure 13

Shell thin, delicate, with a broad shallow sulcus passing from the umbo to the ventral margin; dorsal and ventral margins subrectilinear, almost parallel; surface marked by occasional, concentric growth lines, and very elegantly chiseled with close-set, slightly wavy, parallel, incised lines which run in an oblique direction over the posterior and central part of the valve, but at the anterior end their distal ends turn forwards and upwards in graceful curves; very near the anterior dorsal margin the incised lines are obsolete. Although all our specimens show very nearly the same sculpturing, this may not be a very constant character. Pallial sinus tongue-shaped, very deep, extending forward into the anterior third of the valve. Length of shell 27, altitude 12, semidiameter 4 mm.

P. vicksburgensis Aldrich is listed by Dall from Bowden, but our shell has an elegance and precision of form and sculpture wholly unlike the representation of that species. From the Pliocene to recent *P. Cumingianus* Dunker (*multilineatus* Dall) our shell differs in its smaller size ; its beaks are more anterior ; and the whole shell is proportionately shorter than that species.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao. (Scarce).

Genus DONAX Linné

Donax æqualis Gabb

Plate 39, Figures 10, 11

Donax æqualis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 249, 1873.
Donax æqualis Dall, Trans. Wagner Inst. Sci. vol. 3, pt. 5, p. 966, 1900 ; pt. 6, p. 1587, 1903.

Gabb had but a single small valve measuring 6×4.75 mm We have seven, the smallest 6×4.50 and the largest 9×6.50, indicating that as the shell increases in size the length becomes proportionally slightly greater. This species has never heretofore been figured. It also occurs at Bowden.

Localities.—(Exp'd '16) Bluff 3, Cercado de Mao (6 valves); Zone H, Rio Cana at Caimito (a single shell).

Genus SANGUINOLARIA Lamarck

Sanguinolaria (*Psammotella*) *Smithwoodwardi*, n. sp.

Plate 38, Figures 1, 2

Our fossils very closely resemble recent specimens of *P. operculata* Gmelin (*rufescens* Chemnitz) from the Pacific coast at Acapulco, Mexico. This shell has been usually referred to the genus *Tellina*, but Dr. Dall has pointed out that its true affinities are with *Sanguinolaria*, section *Psammotella*.

Our shells are rostate, inequivalve, the left valve greatly compressed, very flat ; right valve gently convex especially anteriorly ; although we found ten left valves we collected only a single right valve and its interior is concealed by the matrix, its surface is very smooth, marked only with very fine, concentric striæ and faint, obsolete, microscopic radial lines ; umbonal ridge with a shallow, narrow sulcus along its crest and a broad undulatory sulcus in front of the ridge ; left valve marked only by delicate concentric striæ most apparent on the low umbonal ridge, anterior to the ridge is a broad sulcus corresponding to that of the right valve ; pallial sinus deep, widest near its central portion, narrower anteriorly, confluent with the pallial line for a considerable distance ; cardinal teeth two, the anterior heavy, strongly bifid. Length of right valve 49, altitude 25, diameter 6 ; corresponding measurements of a left valve are 55 × 26 × 4 mm.

A beautiful and striking shell, immediately recognized by its rostrate and discrepant valves. It is named in honor of Dr. A. Smith Woodward of the British Museum.

Localities.— (Exp'd '16) Bluff 3, Cercado de Mao ; Zones H and I, Rio Cana at Caimito.

Genus SOLEN Linné

Solen (*Solena*) *obliquus* Spengler

Solen obliquus Spengler, 1794. Not of Sowerby 1844.

We collected a fragment of a *Solen* which exactly matches specimens of the recent *S. obliquus* collected on the Monte Cristi beach. Our fossil shows the distal half of a large shell. Unfortunately the hinge characters are not known, but judging from what we have, the fossil and recent shells are identical. The genus has not heretofore been found in the blue clays of Santo Domingo.

Locality.—(Exp'd' 16) Zone I, Rio Cana at Caimito.

Genus SILIQUA Megerle von Mühlfeldt

Siliqua subæqualis Gabb

Plate 39, Figure 12

Siliqua subæqualis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 247, 1873.

Siliqua subæqualis Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 5, p. 956, 1900.

A delicate, translucent shell characterized by its nearly central beaks. Exterior marked only by concentric lines ; polished ;

main interior rib passing more or less obliquely from the beak towards the straight ventral margin. Length 24, altitude 10, semidiameter 2 mm. ; a larger shell measures 32 × 12.

Fragments from the Chipola beds, Florida, have been doubtfully referred to this species.

Localities—(Exp'd '16) Bluff 3, Cercado de Mao; Zone H, Rio Cana at Caimito.

Genus MACTRA (Linné) Lamarck

Mactra (*Mactrella*) cf. *alata* Spengler

Mactra alata Spengler, Skrivt. Nat. Selsk., vol. 5, pt. 2, p. 99.

Mactrella alata Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 248, 1873.

Mactra alata Dall and Simpson, Bull. U. S. Fish. Comm., vol. 20, pt. 1, p. 474, 1900.

We found a fossil shell which may be the young of *M. alata* of which our party gathered many large, fine specimens on the Monte Cristi beach. Gabb remarks that his fossils were also small, but in other respects resembled the recent which then was recorded only from the West coast of Columbia. Later it was found by Gundlach in Porto Rico.

Locality.—(Exp'd '16) Bluff 3, Cercado de Mao.

Genus CORBULA Lamarck

Corbula (*Aloidis*) *vieta* Guppy

Plate 39, Figure 13

Corbula vieta Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 580, pl. 26, fig. 8, 1866. (Right valve).

Erycina tensa Guppy, *Id.*, p. 582, pl. 26, fig. 6, 1866. (Left valve).

Corbula disparilis Gabb Trans. Amer. Phil. Soc., vol. 15, p, 247, 1873. Not *disparilis* d'Orbigny 1845.

Corbula vieta Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 530, 1876.

Corbula (*Aloidis*) *vieta* Dall, Trans. Wagner Inst. vol. 3, pt. 4, p. 849, 1898.

We have about half a dozen right valves of this species, the largest measuring in length 10, altitude 10, semidiameter 5.5 mm. The majority are much smaller. The left valve is very different and was erroneously referred by Guppy to *Erycina tensa*. The type locality is Manzanilla, Trinidad. Also found at Bowden and in the Trinidad and Costa Rican Pliocene.

Localities. —(Exp'd '16) Bluff 2, Cercado de Mao ; Zone I, Rio Cana at Caimito.

Corbula (*Cuneocorbula*) *dominicensis* Gabb

Plate 39, Figures 14, 15

Corbula Dominicensis Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 247, 1873.

Corbula (*Cuneocorbula*) Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 847, 1898.

Shell about the size of *Bothrocorbula viminea* but without the lunular pit, more finely sculptured, flatter and thinner. The two valves are very nearly alike, moderately convex, posterior end angulated, beaks sub-central. Length of left valve 13.5, altitude 9, semidiameter 4 mm. This species has not heretofore been figured but our shells agree with Gabb's description.

Locality.—(Exp'd '16) Sandy clay and Zone H, Rio Cana at Caimito.

Corbula (*Cuneocorbula*) *cercadica*, n. sp.

Plate 39, Figures 16, 17

Cf. *Corbula Lavaleana* Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 247, 1873. Not *C. Lavaleana* d'Orbigny 1845.

Thousands of valves of a small *Corbula* were collected by us at Cercado where it is extremely abundant. This is probably the species of which Gabb also found a large number and referred to the recent *C. Laraleana* d'Orbigny. But it is smaller than that species and differs markedly in its broader and much less elevated beaks. Our shell is very finely concentrically sculptured and some specimens show faint radial striæ as in *C. Lavaleana*. From the Bowden *C. sericea* Dall, our shell differs in being less short and high, proportionally longer and in lacking the profound sulcation anterior to the umbonal ridge characteristic of the Bowden shell. The valves of this very abundant Dominican species are discrepant, the left smaller and shorter, not reaching the posterior end of the right valve. A large shell measures 6.5 in length, 4.75 altitude, 2 mm. semidiameter, but the great majority are smaller.

Locality. — (Exp'd '16) Bluff 3, Cercado de Mao.

Corbula (*Cuneocorbula*) *caimitica*, n. sp.

Plate 39, Figures 18, 19

? Corbula contracta Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 247, 1873. Not *C. contracta* Say, 1822.

Gabb lists *Corbula contracta* in his Santo Domingo Report, but none of the specimens we collected agree with our specimens of *C. contracta* from the Carolinian Pliocene. Moreover, *fide* Dall the latter species does not occur anterior to the Pliocene. We have a few valves from Rio Cana perhaps identical with what Gabb called *contracta.* They are, however, more like d'Orbigny's figure of the recent *C. caribæa*, but our fossils are more sinuous, contracted and pointed posteriorly. Slightly larger than *C. cercadica* and differing in outline, they are readily distinguished by their much sharper and stronger concentric sculpture. Valves discrepant, the left being smaller and flatter. A large right valve measures in length 7, altitude 4.75, semidiameter 3 mm.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito.

Corbula (*Bothrocorbula*) *viminea* Guppy

Plate 39, Figures 20, 21

Corbula viminea Guppy, Quart. Jour. Geol. Soc. London, vol. 22, p. 293, pl. 18, fig. 11, 1866.

Bothrocorbula viminea Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 247, 1873.

Corbula viminea Guppy, Quart. Jour. Geol. Soc., vol. 32, p. 529, 1876.

Corbula (*Bothrocorbula*) *viminea* Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 4, p. 850, 1898.

This species is remarkable for a very deep sub-circular, lunular pit directly in front of the beak. Because of this Gabb created for the species the genus *Bothrocorbula*, considered by Guppy and by Dall as only of sectional or subgeneric value since a connecting series leads without break to *Cuneocorbula*. Some aged individuals in our collection have become greatly thickened and inflated so as to appear pathologic. Length 16, altitude 10.5, semidiameter 4; a greatly thickened valve measures 16×11×9 mm.

First described from Jamaica, this species is also reported from Vamos-Vamos Station, Panama.

Localities.—(Exp'd '16) Bluff 3, Cercado de Mao; Zone G, Rio Gurabo at Los Quemados; Zone I, Rio Cana at Caimito. (Rather common).

Genus MARTESIA Leach

Martesia Sancti-Dominici, n. sp.

Plate 39, Figure 22

Shell small, ovate, with accessory dorsal and ventral valves; lateral valves with a nearly central, oblique deep groove, anterior to which the valve is sculptured with exceedingly close, fine, sharp and smooth, concentric threads, not crenulate, there being no trace of radials; posterior to the groove the concentric sculpture is lacking and the surface smooth except for fine, irregular growth striæ. Length of shell 11, altitude 7, diameter 7.25 mm.

The only species described heretofore from the Antillean Oligocene is *M. sphæroidalis* Guppy, and Dall thinks that should probably be referred to another group. This species and the one described below are apparently true *Martesias*. Gabb mentions finding a small *Martesia*, but imperfect and showing no trace of the accessory valve.

Locality.—(Exp'd '16) Zone H, Rio Cana at Caimito. (Rare).

Martesia Sancti-Pauli, n. sp.

Plate 39, Figure 23

Shell showing clearly dorsal and ventral accessory plates; small, oblong, with an external oblique groove forming an internal rib, dividing the shell into a slightly shorter anterior and longer posterior portion ; the surface anterior to the groove is sculptured with extremely fine, sharp, concentric threads prettily crenulated by their intersection with fine radial impressed lines ; on approaching the groove the radials abruptly end ; the posterior portion of the valve is ornamented onlv with concentric lines set at an angle to the anterior lines and about twice as far apart. Length 8, altitude 5, semidiameter 3 mm.

Locality.—Exp'd '16) Bluff 3, Cercado de Mao. (Rare).

Genus TEREDO Linné

Teredo incrassata Gabb

Plate 39, Figure 24

Kuphus iucrassatus Gabb, Trans. Amer. Phil. Soc., vol. 15, p. 246, 1873; Jour. Acad. Nat. Sci. Phila., vol. 8, new. ser. p. 342, pl. 44, fig. 12 a-e.

Teredo fistula ? Guppy, Quart. Jour. Geol. Soc. London, vol. 32, p. 529, 1876.

Teredo incrassata Dall, Trans. Wagner Inst. Sci., vol. 3, pt. 6, p. 1587, 1903.

These tubes were first seen loose on the road from Los Quemados to Caimito. They were several feet long and at first glance appeared to be exposed roots of trees. They are frequently incrusted with a hydrocoralline. Gabb found them east of Guayubin and in the Sambas.

Localities. —(Exp'd '16) Teredo limestone, above the *Arca patricia* beds, Rio Cana at Caimito (scattered through the soft yellowish limestone); Bluff 3, Cercado de Mao (comparatively rare); Samba Hills, approximate altitude 540 feet.

Printed April 27, 1917

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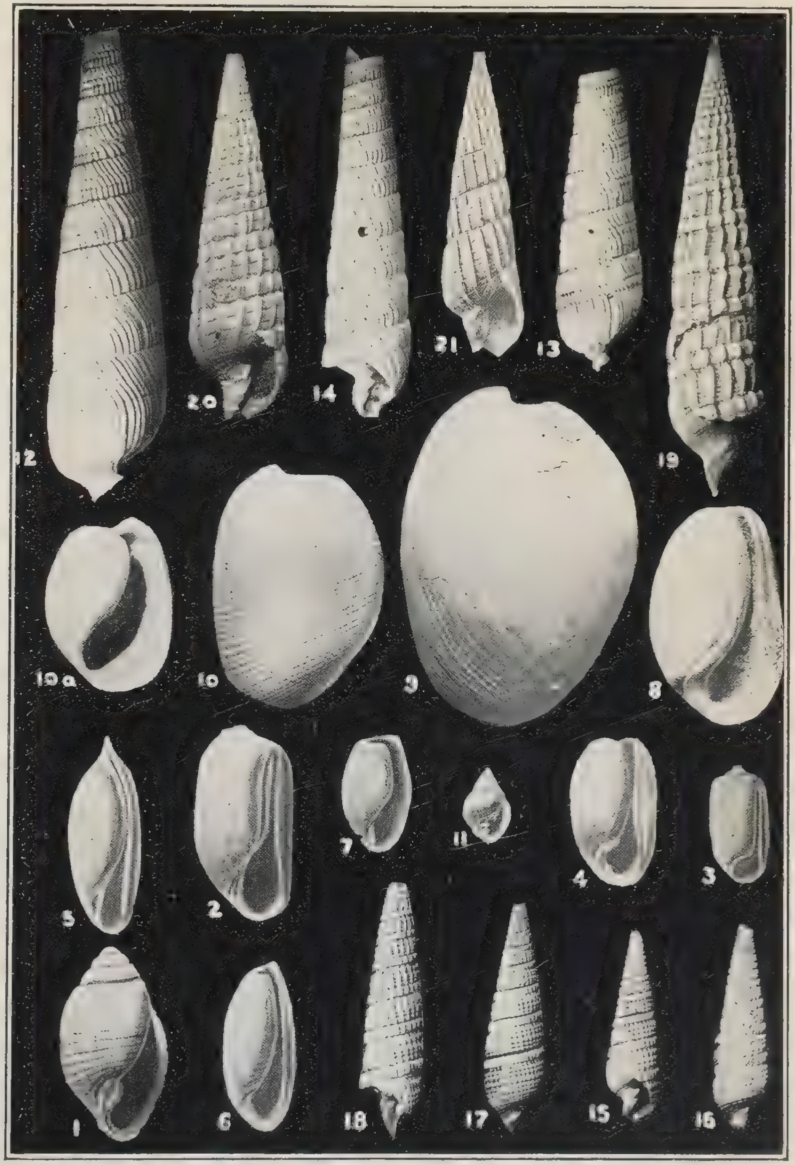
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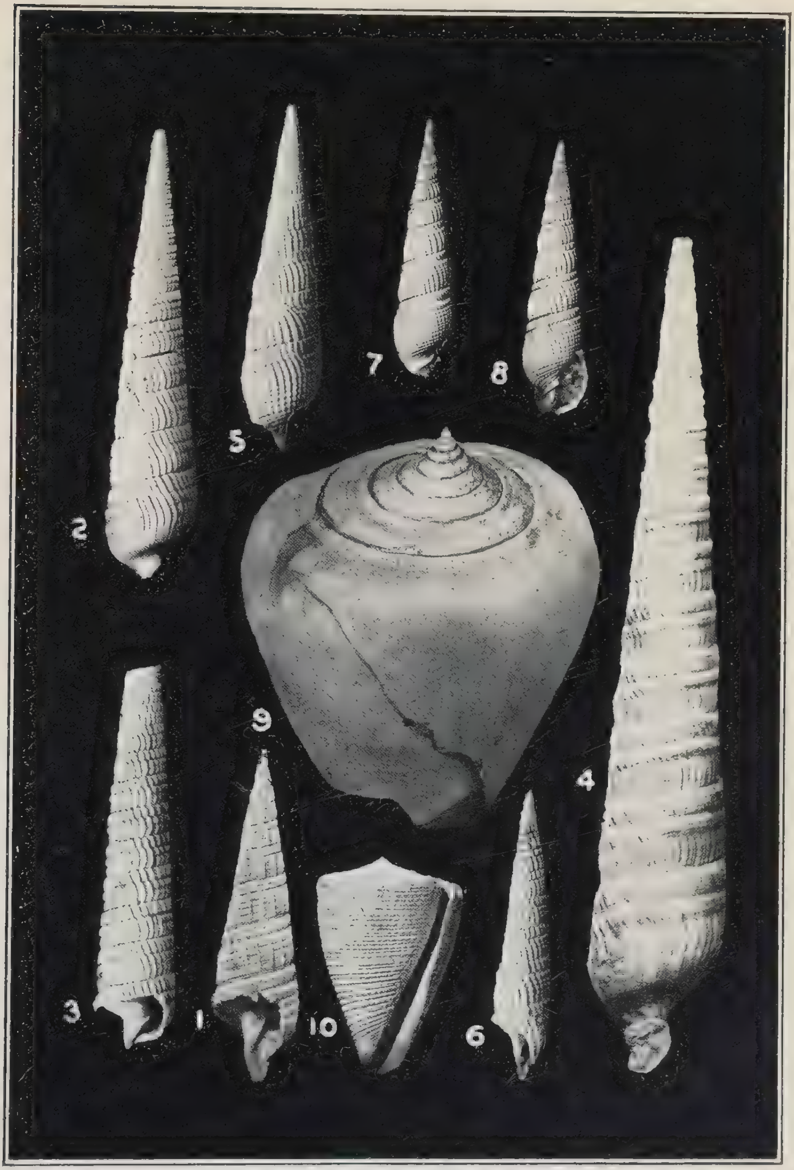
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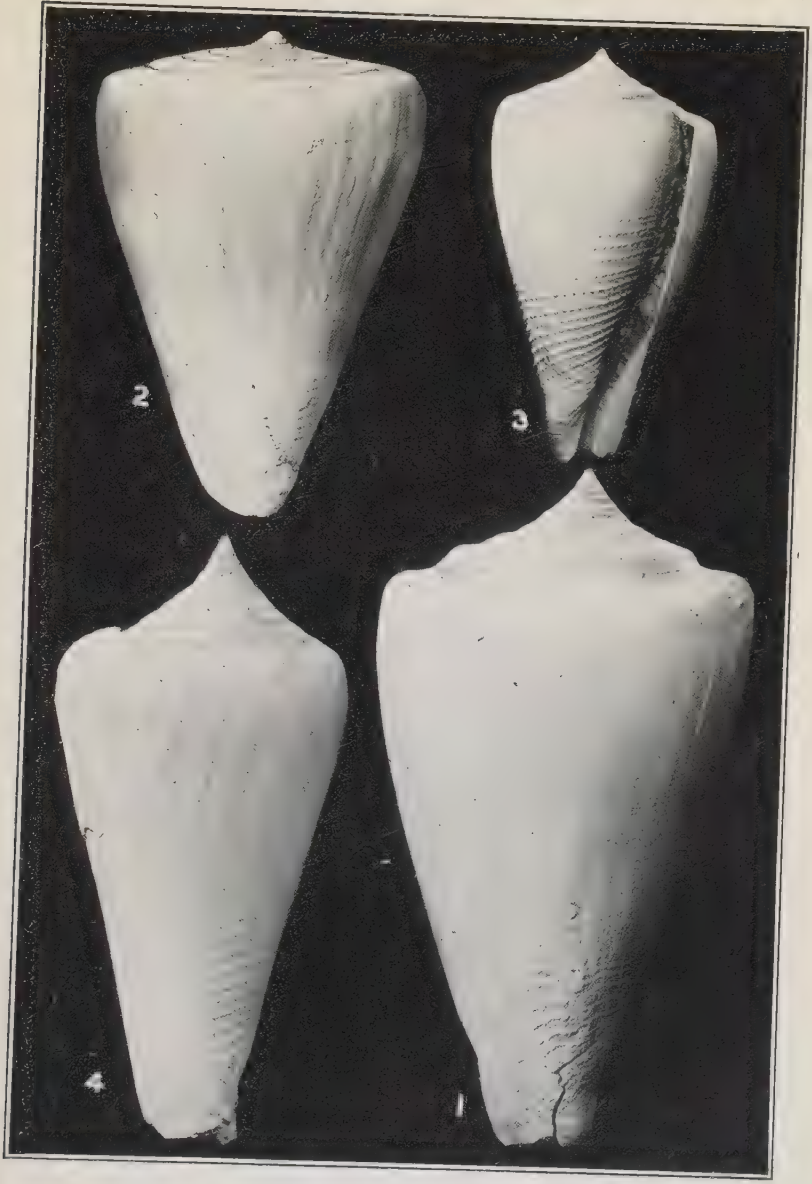
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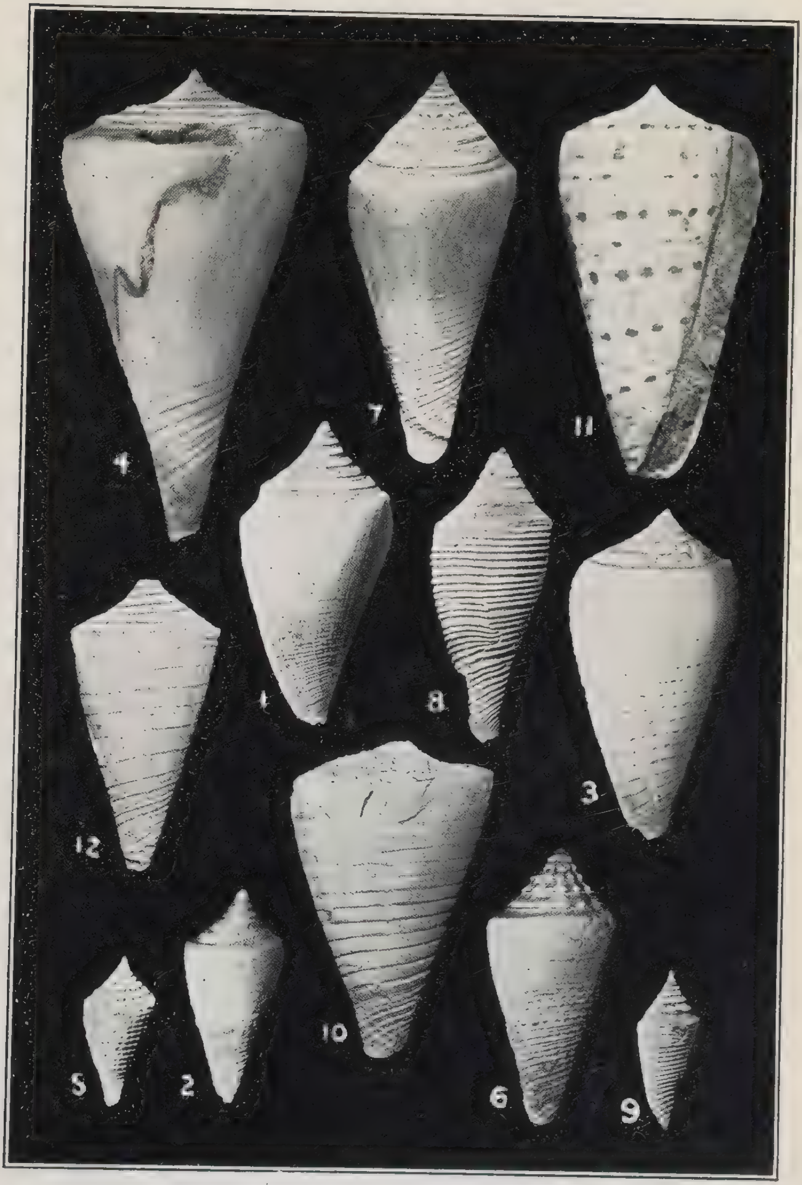
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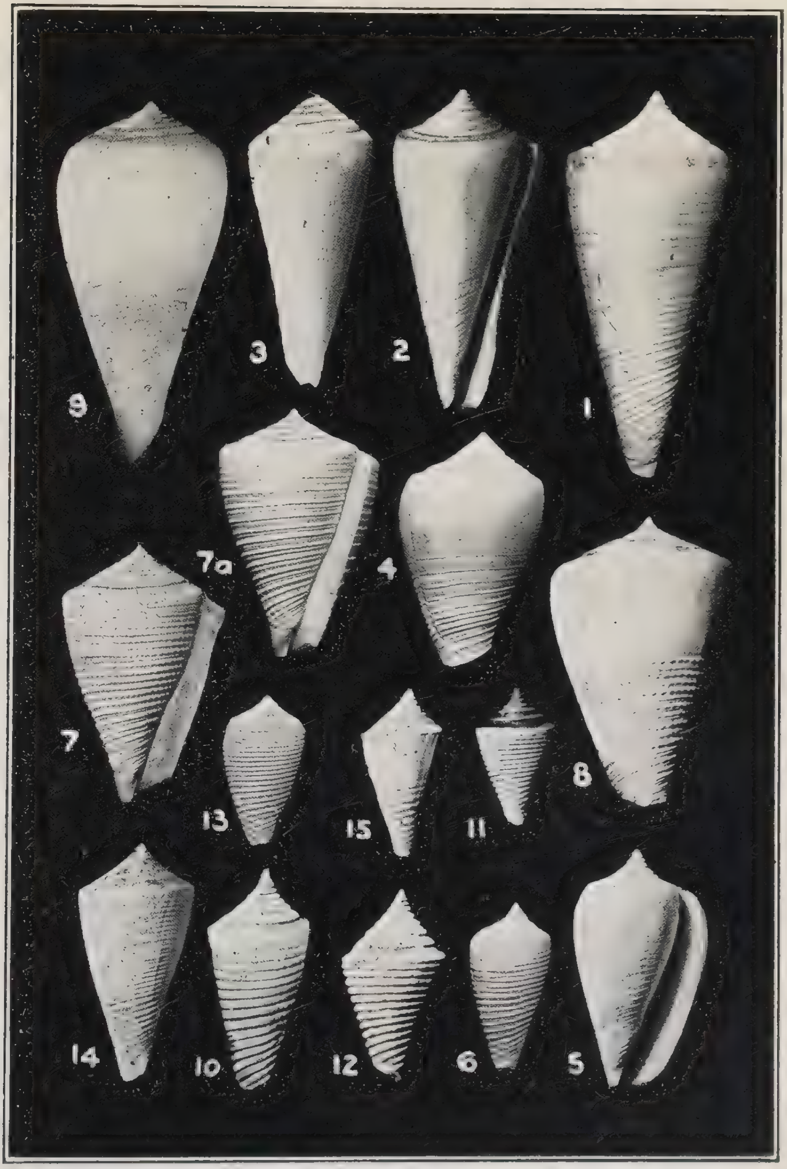
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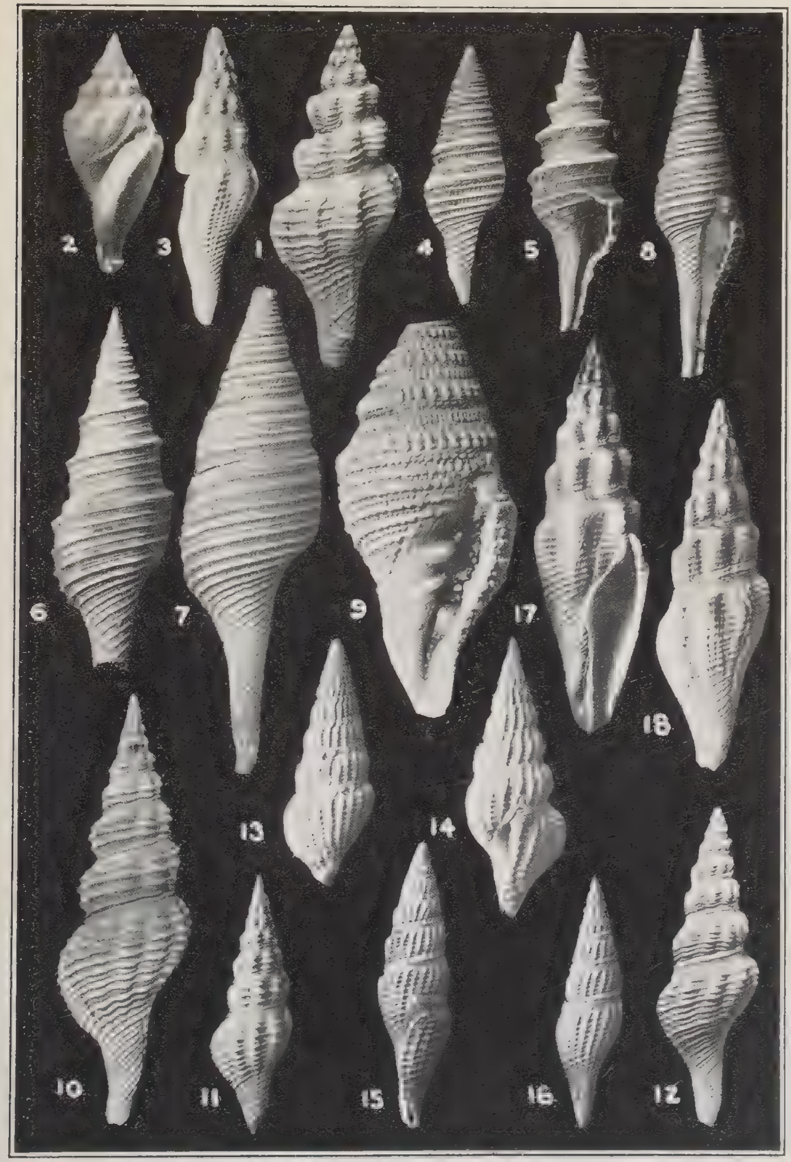
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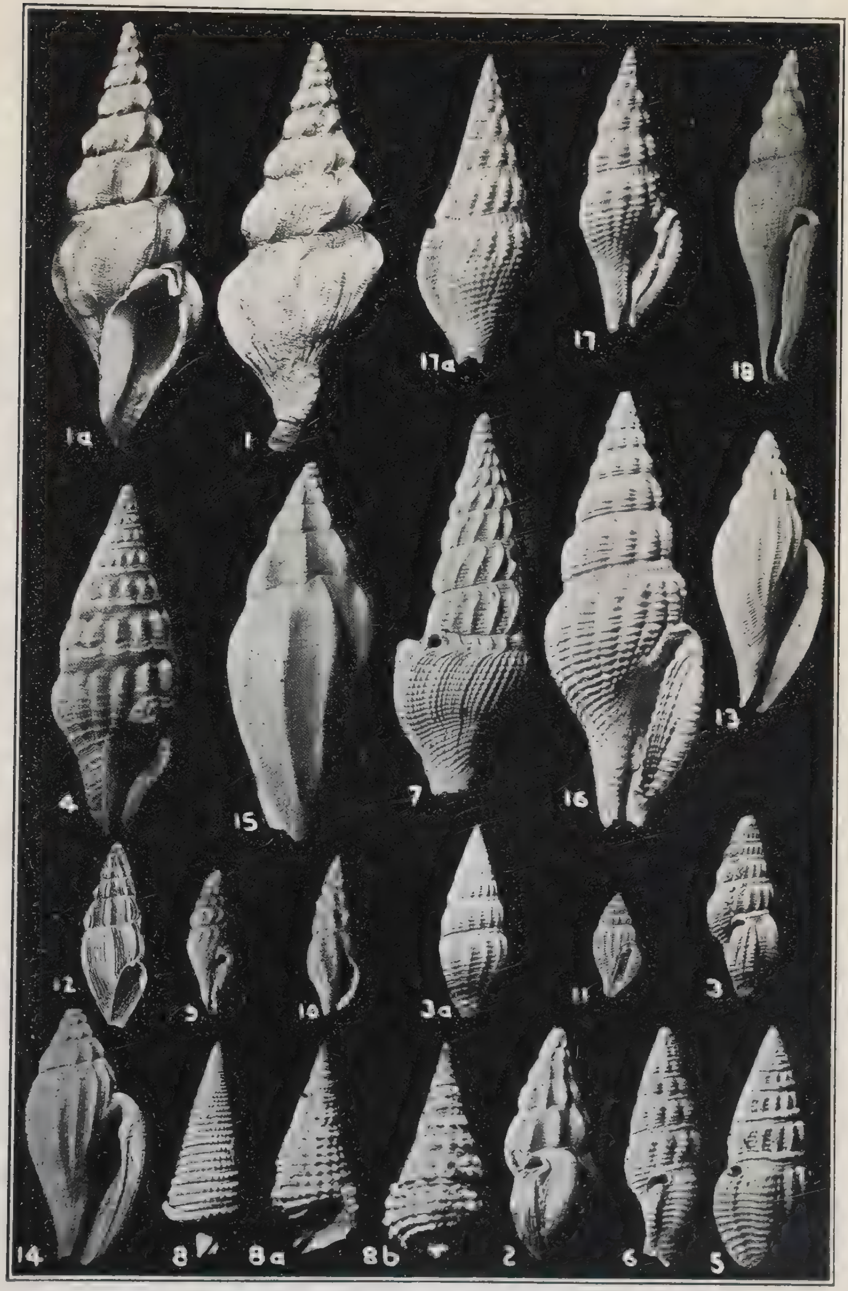
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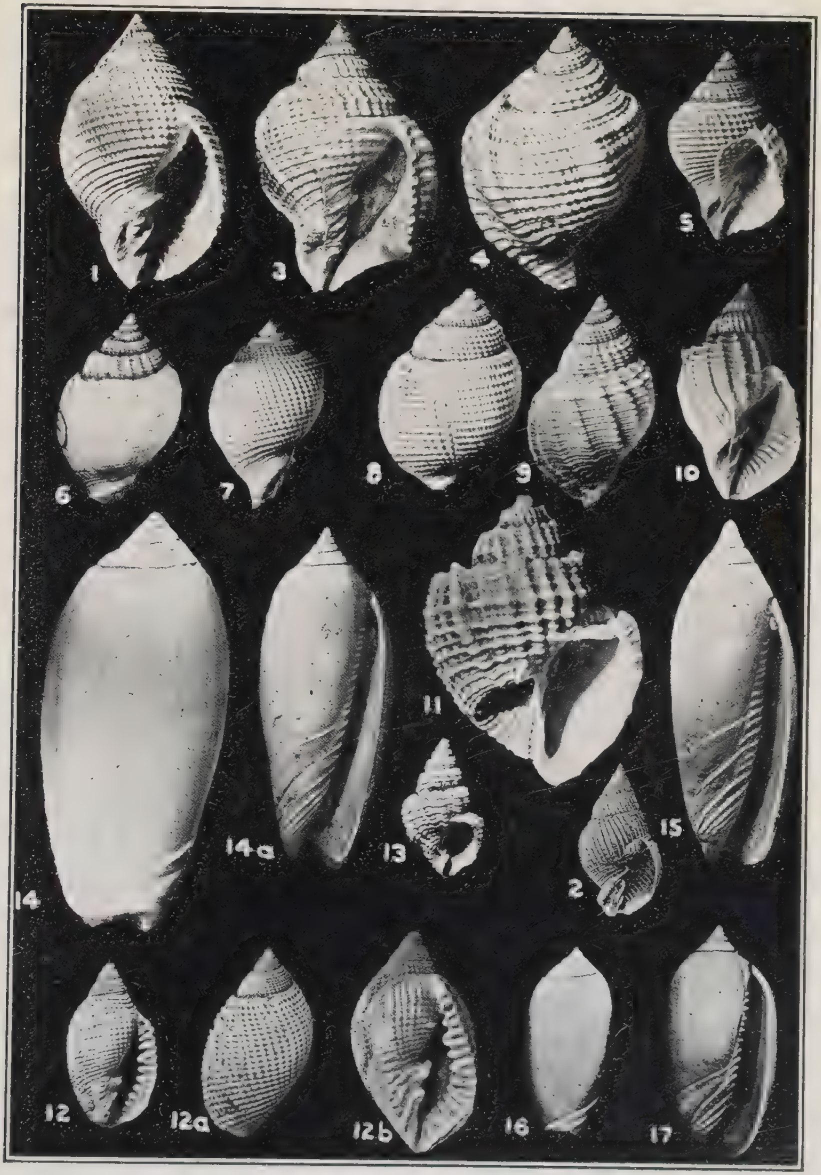
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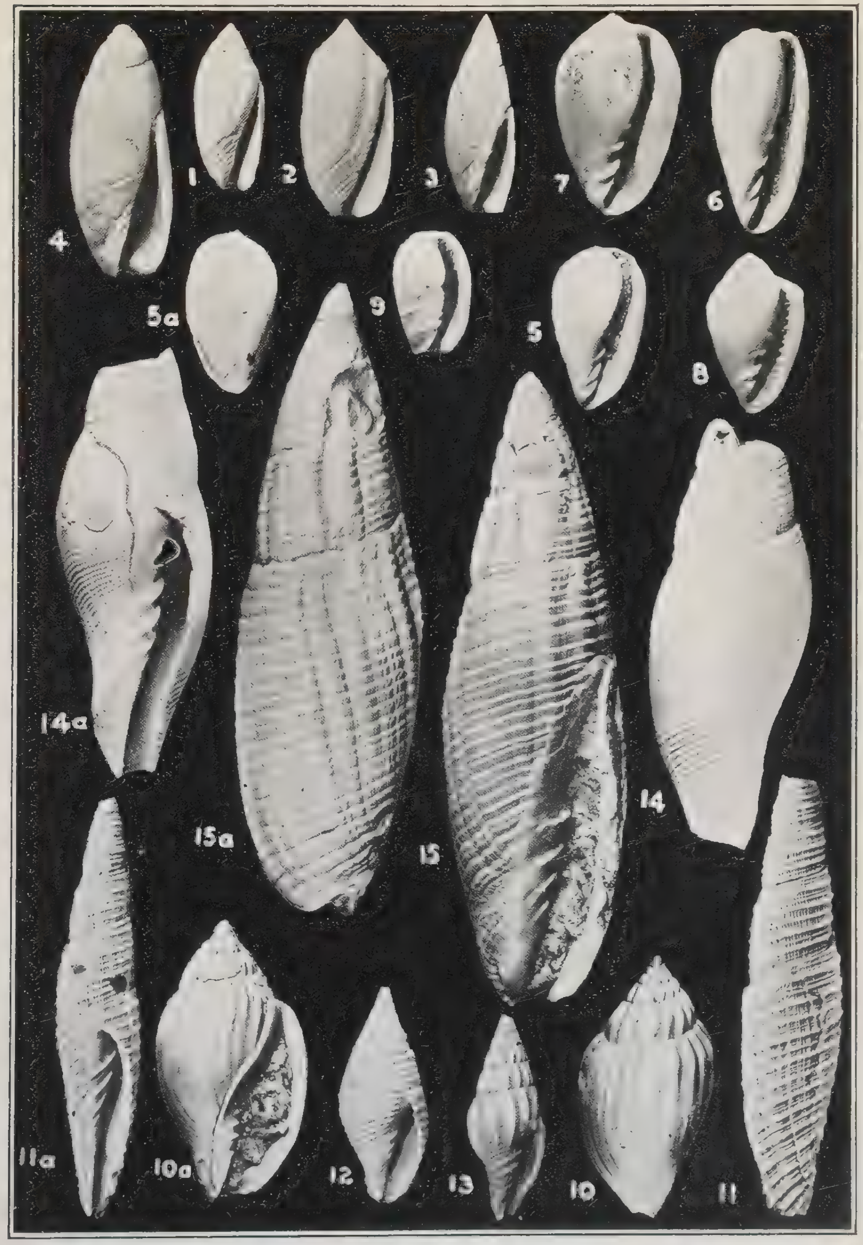
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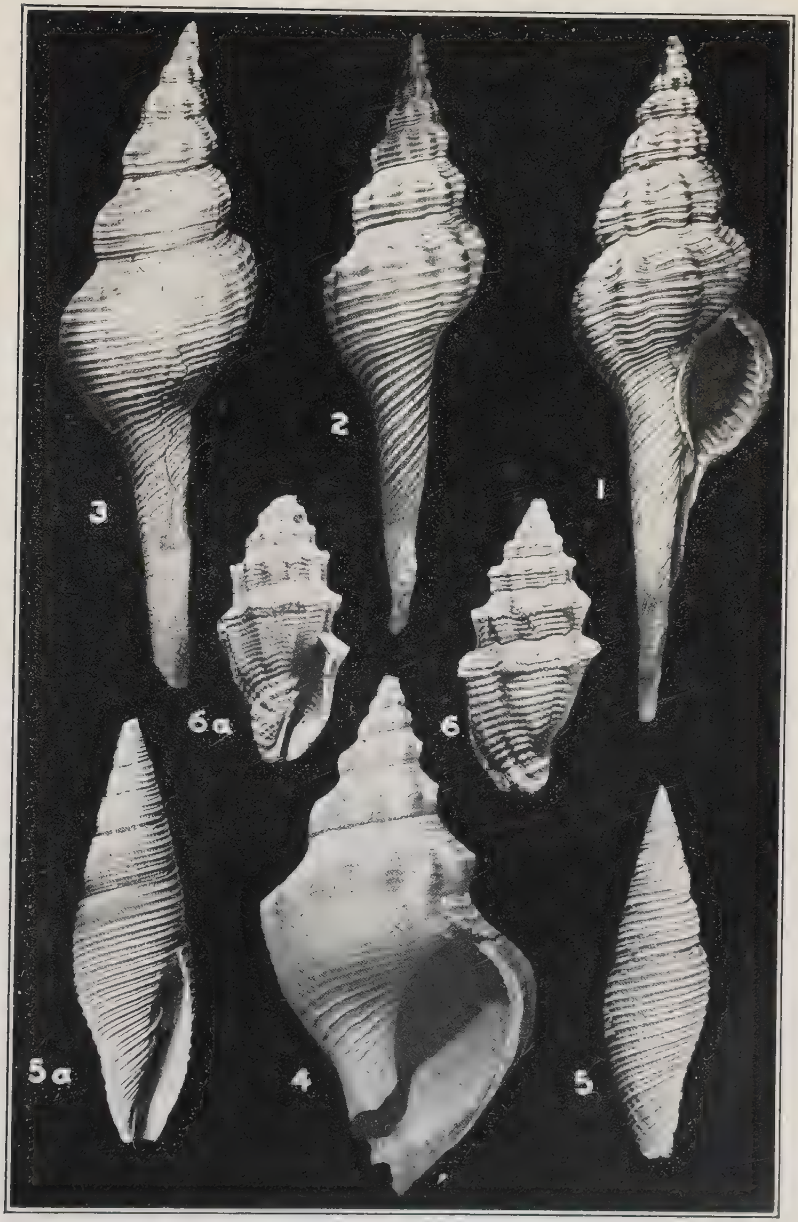
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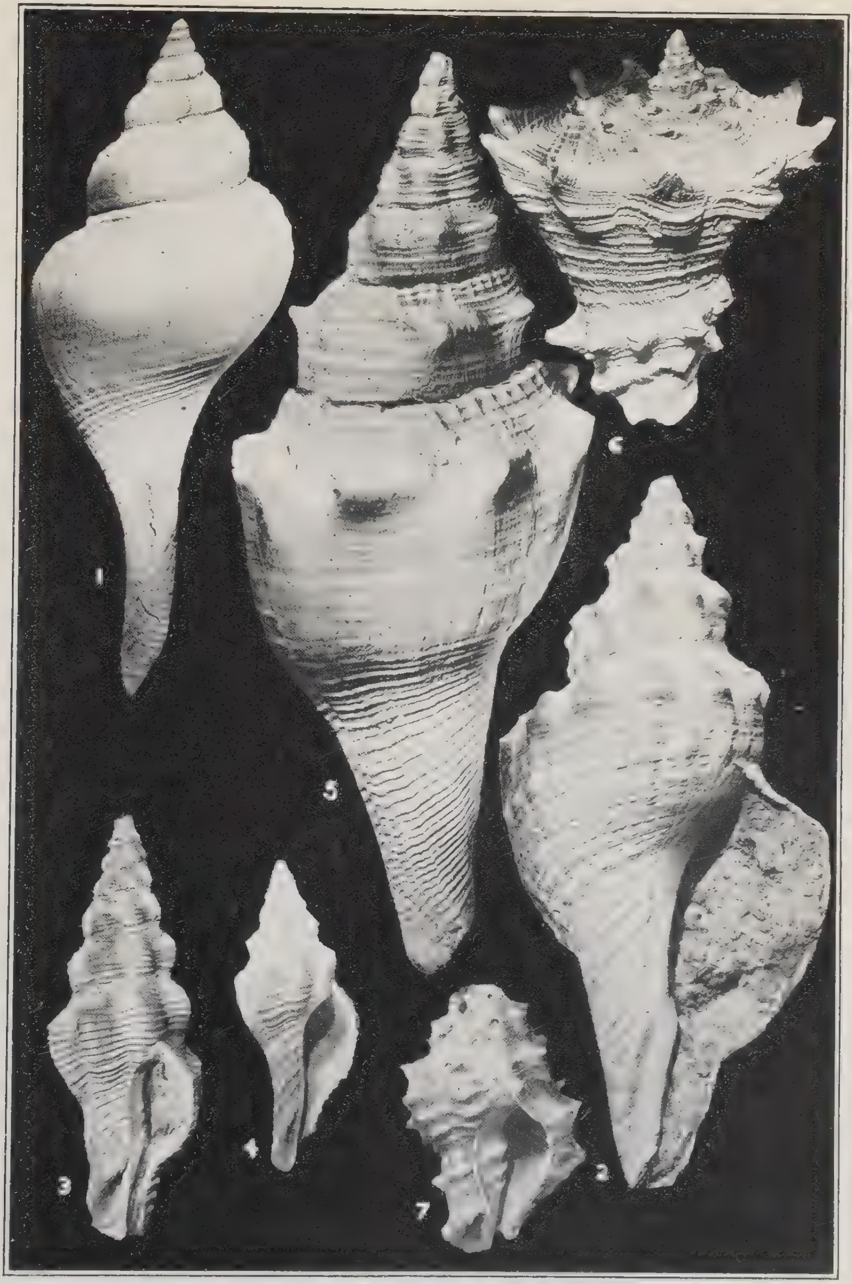
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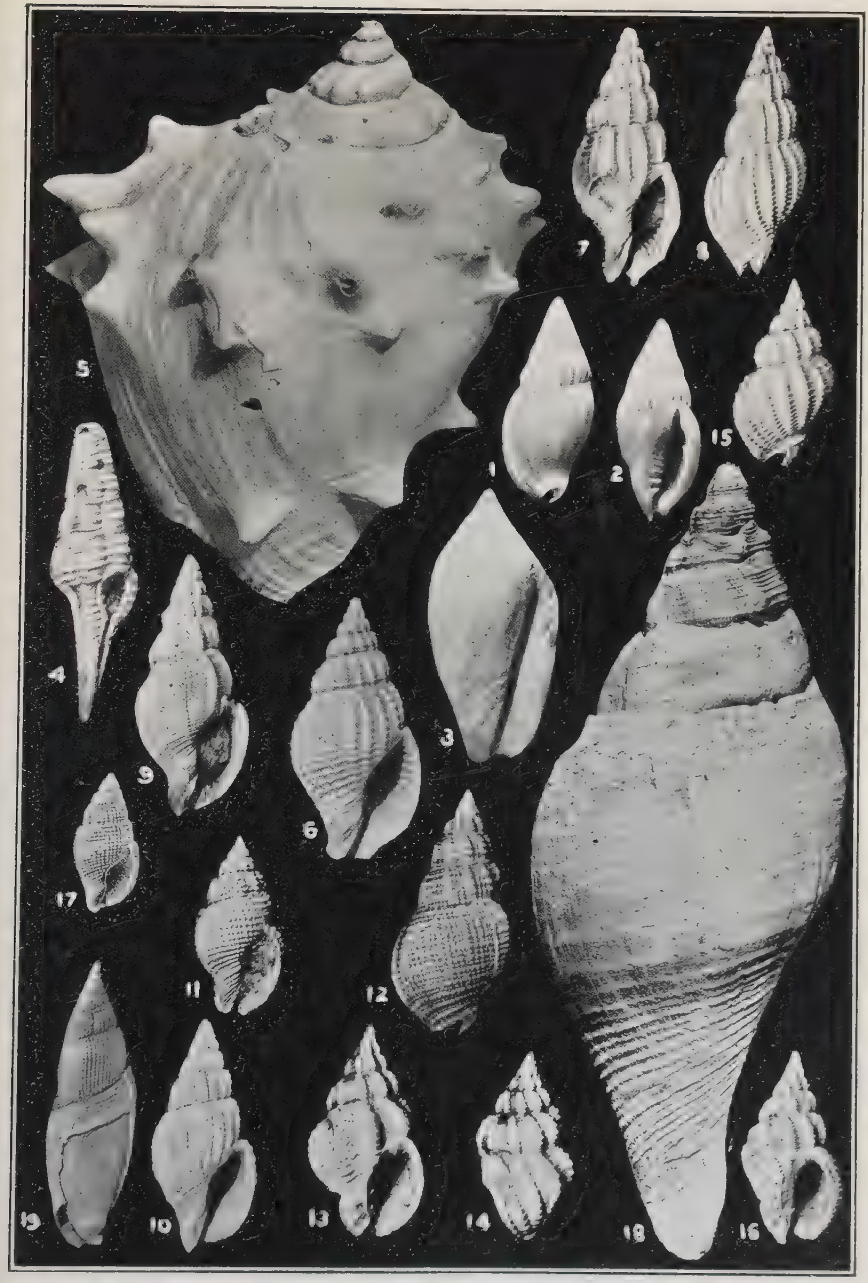
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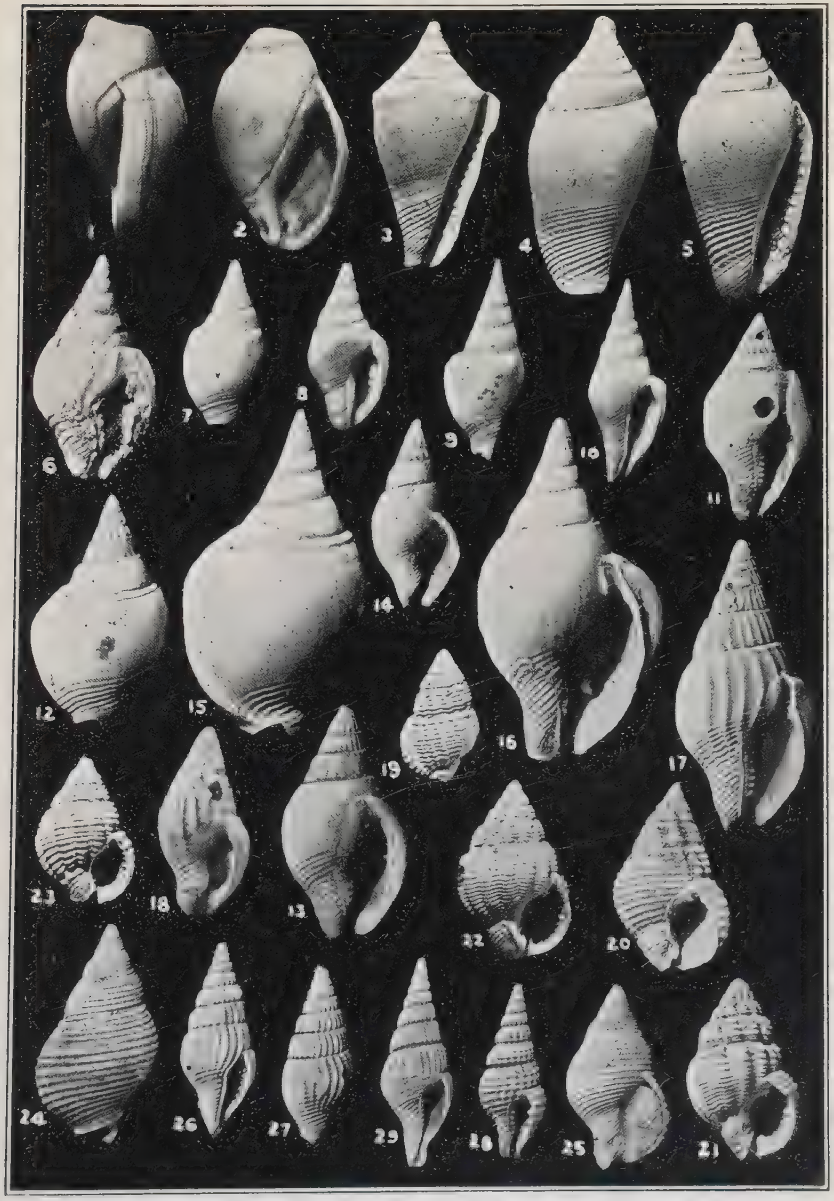
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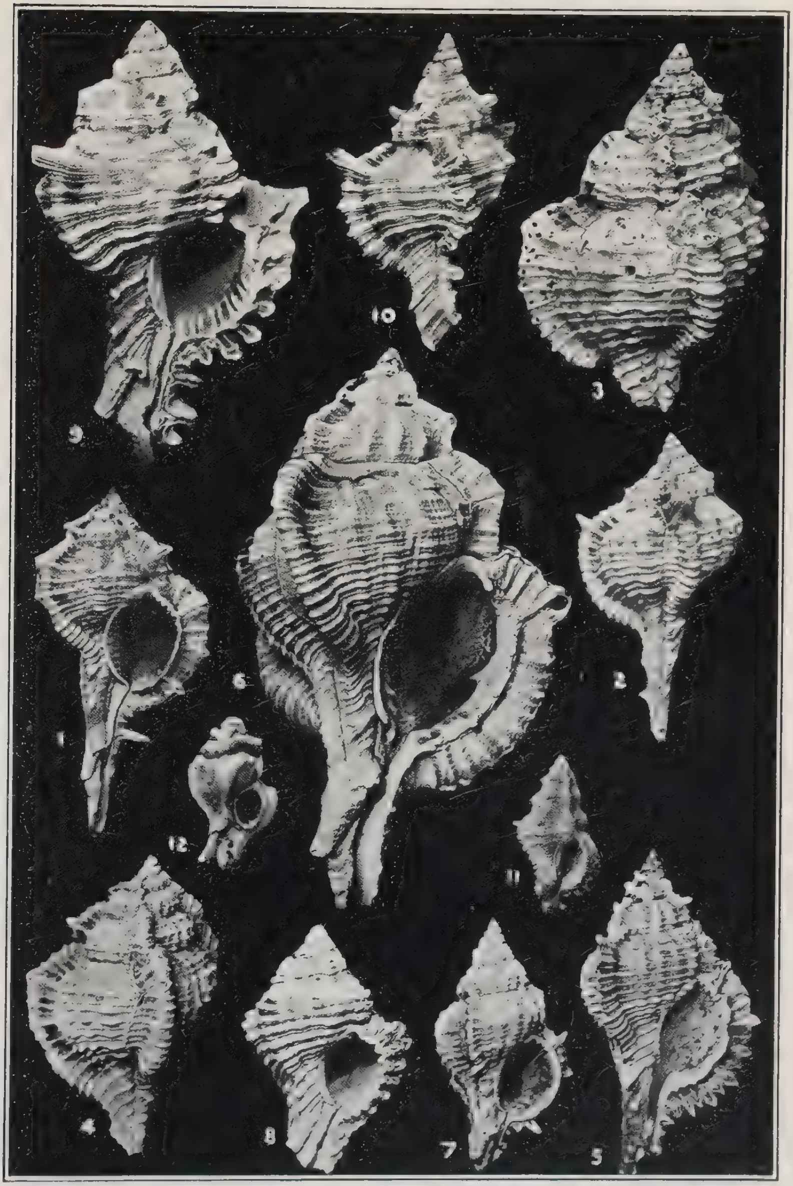
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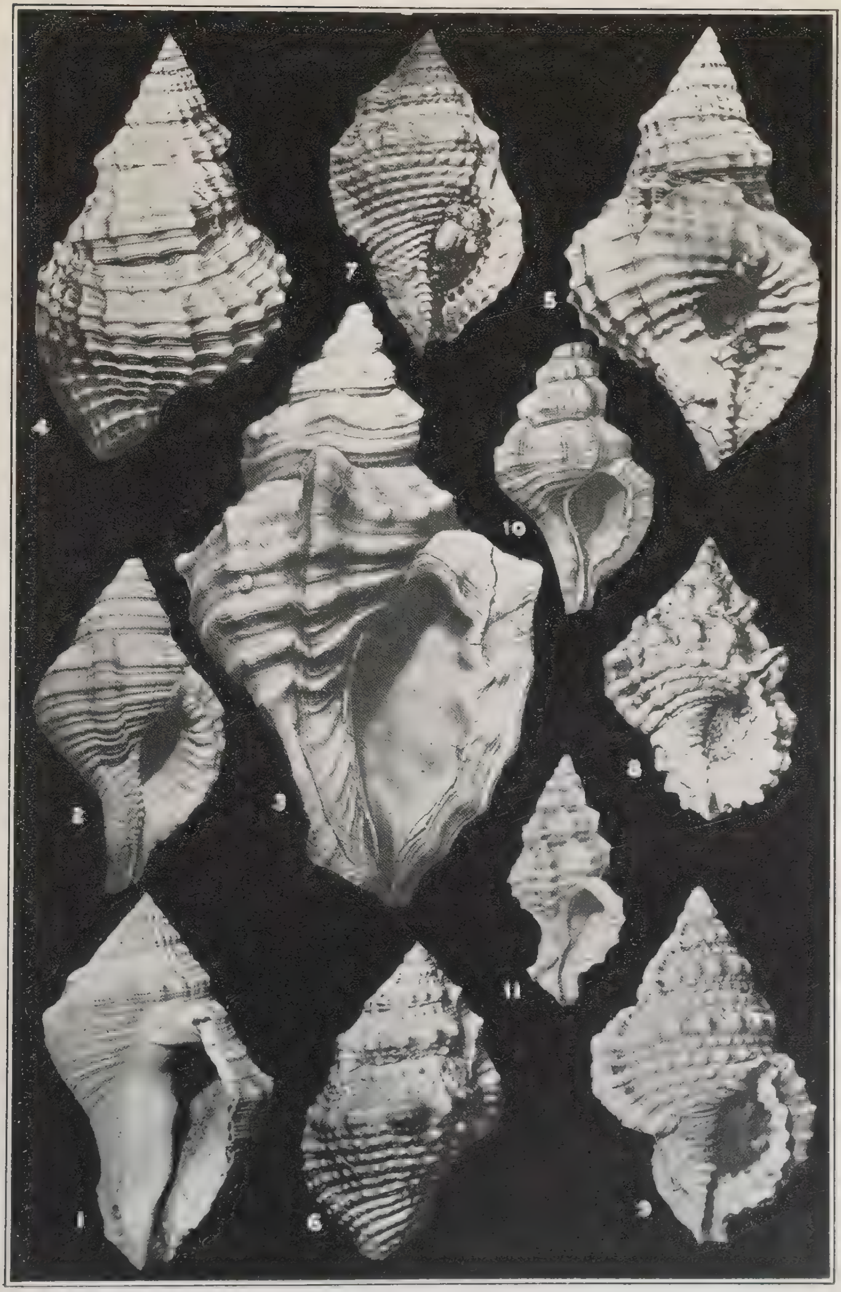
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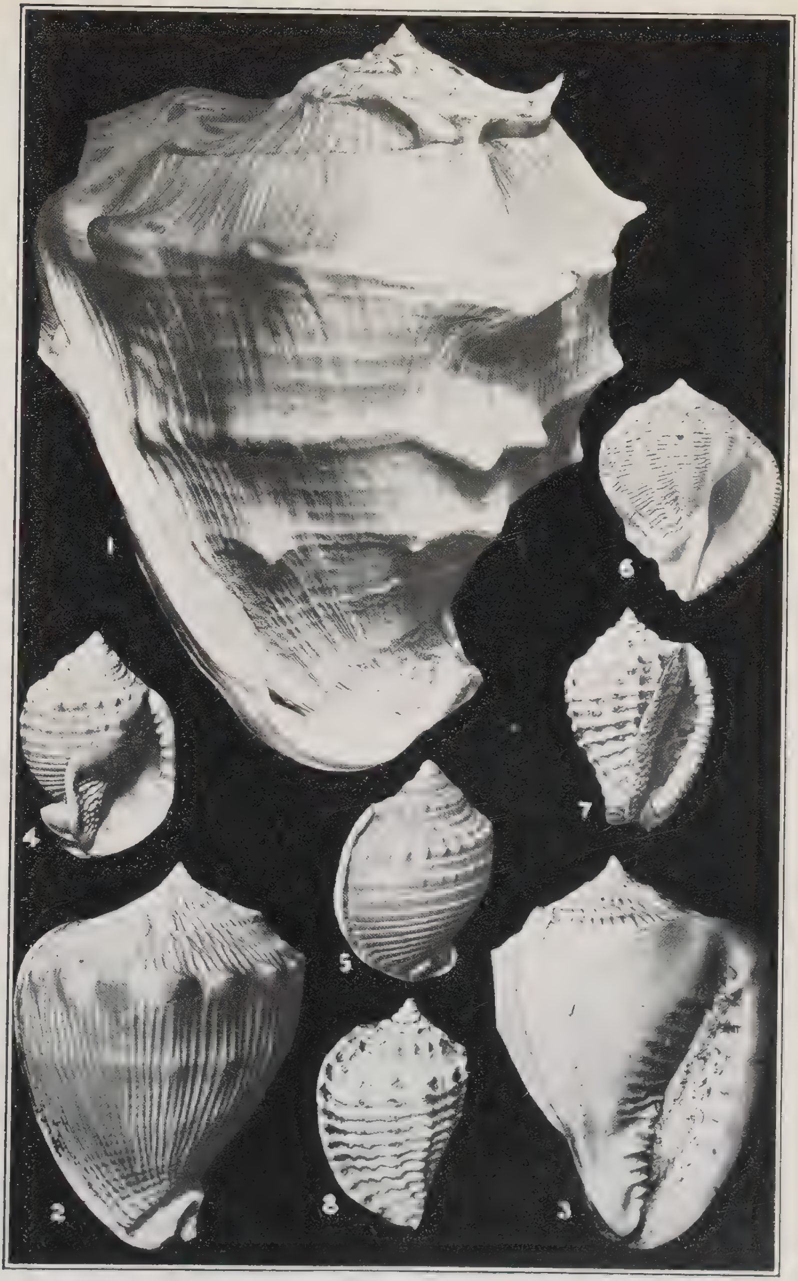
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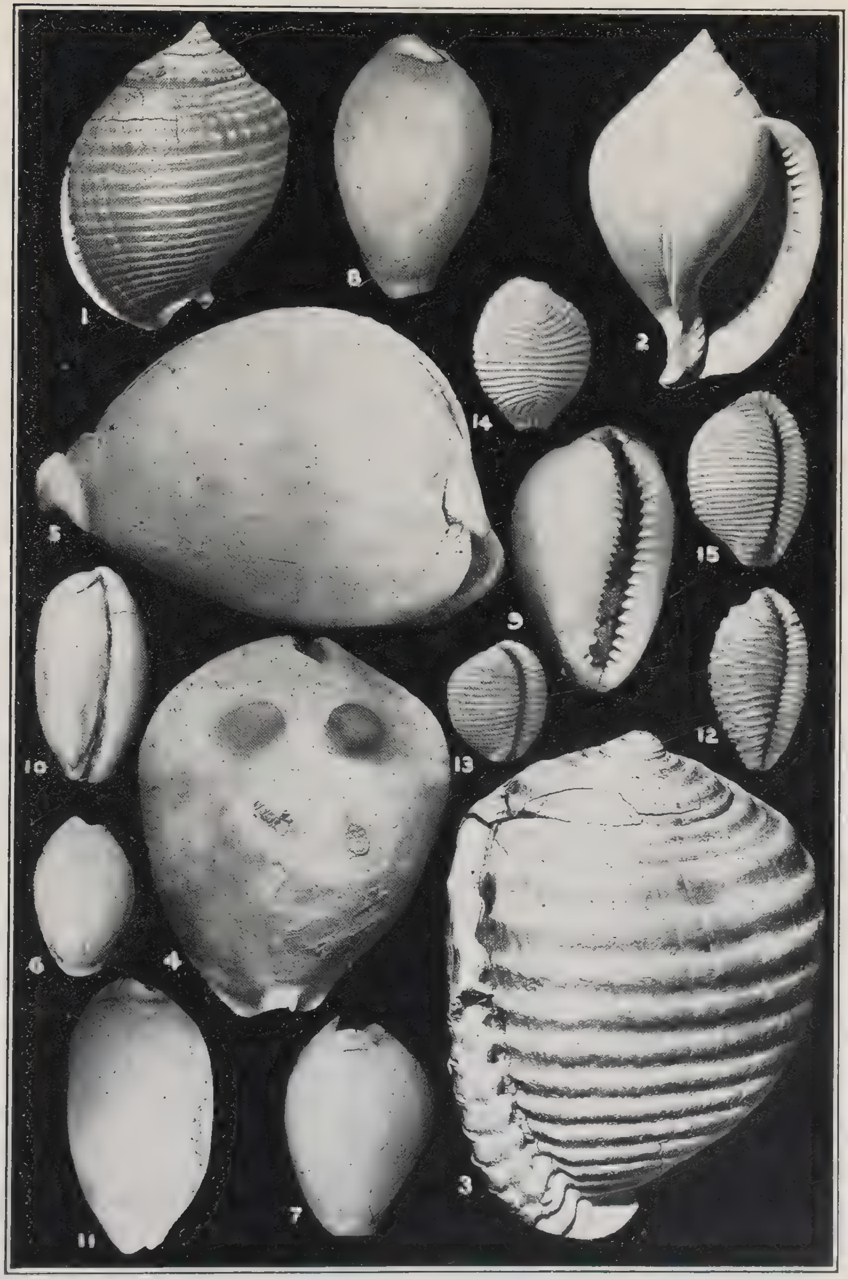
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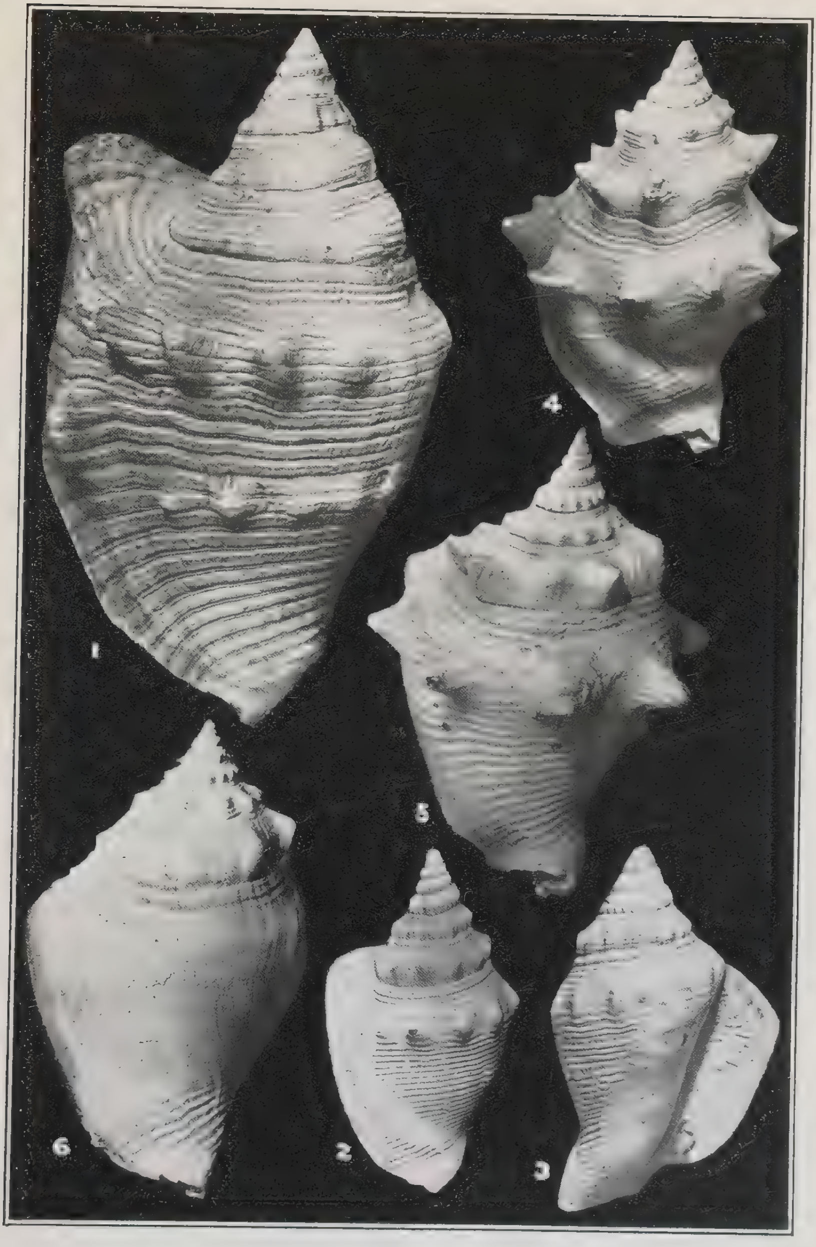
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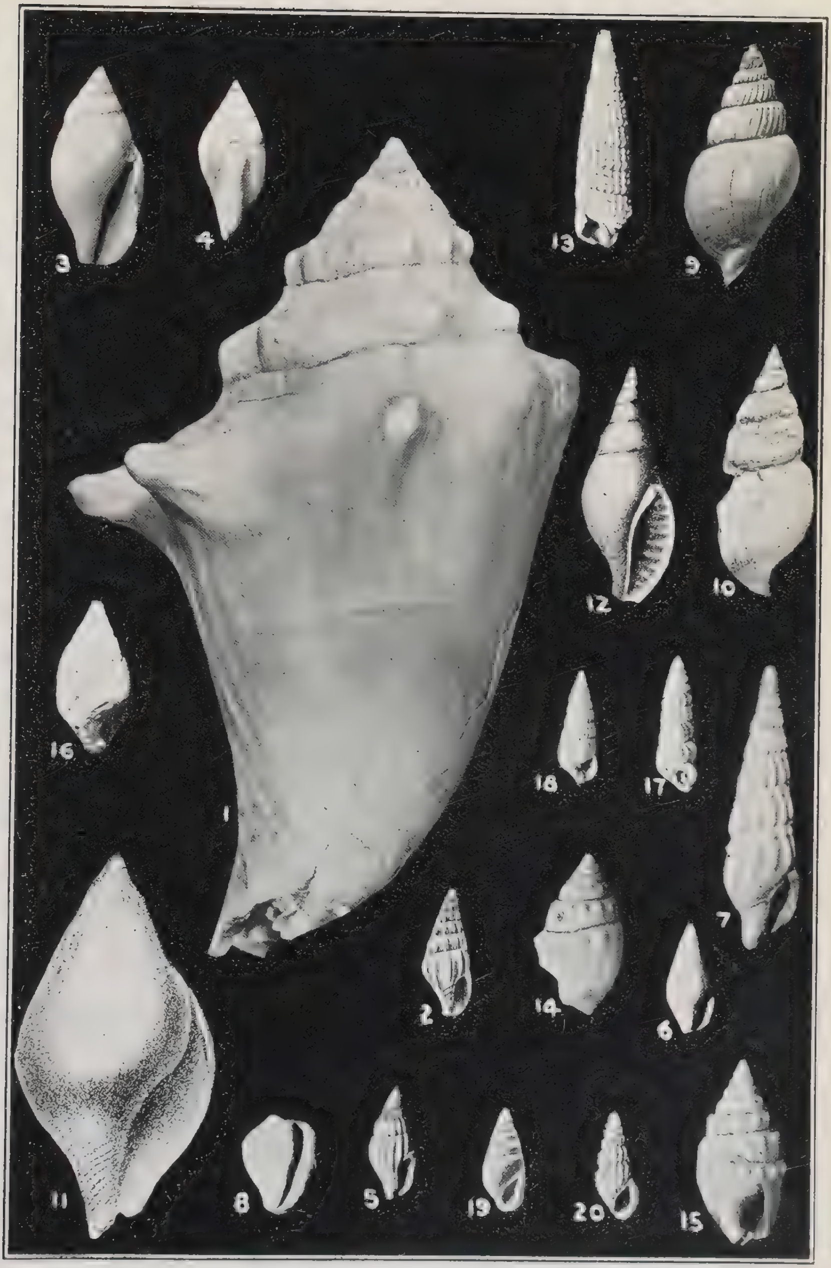
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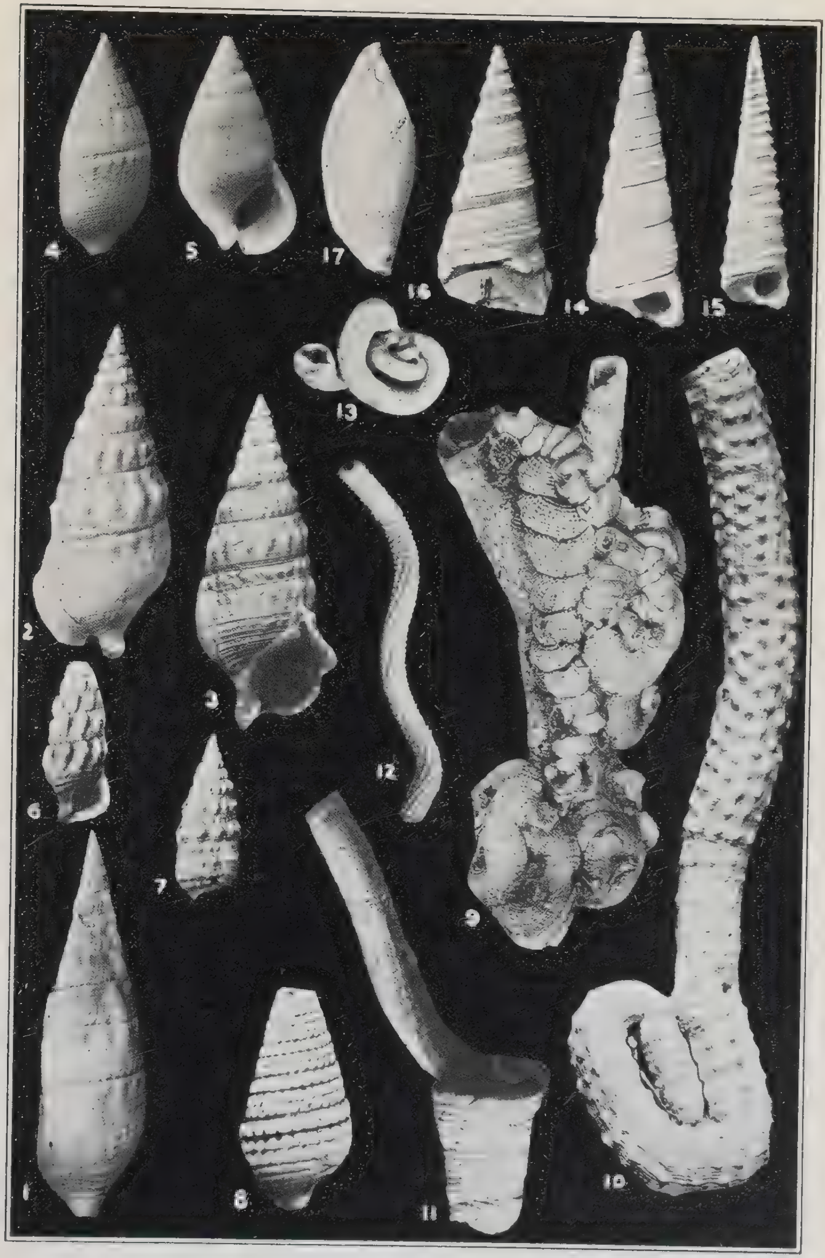
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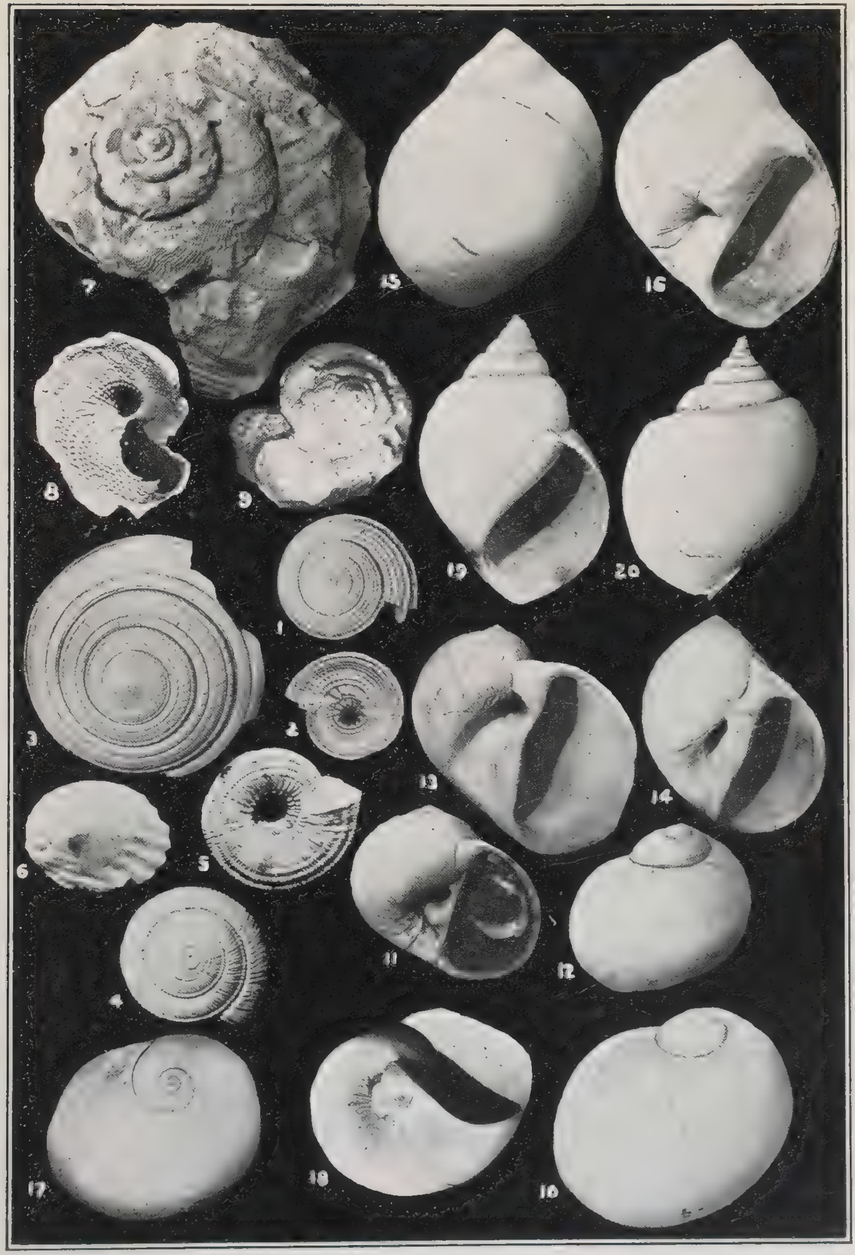
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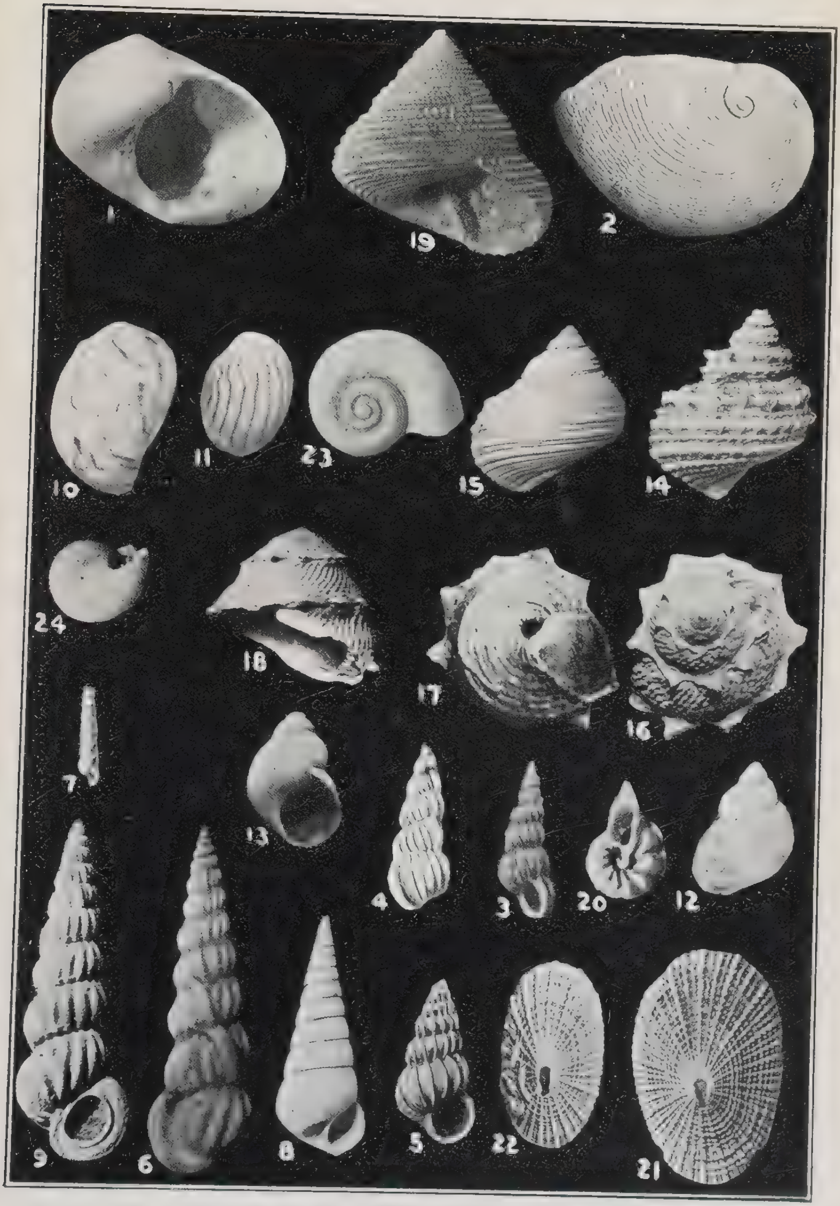
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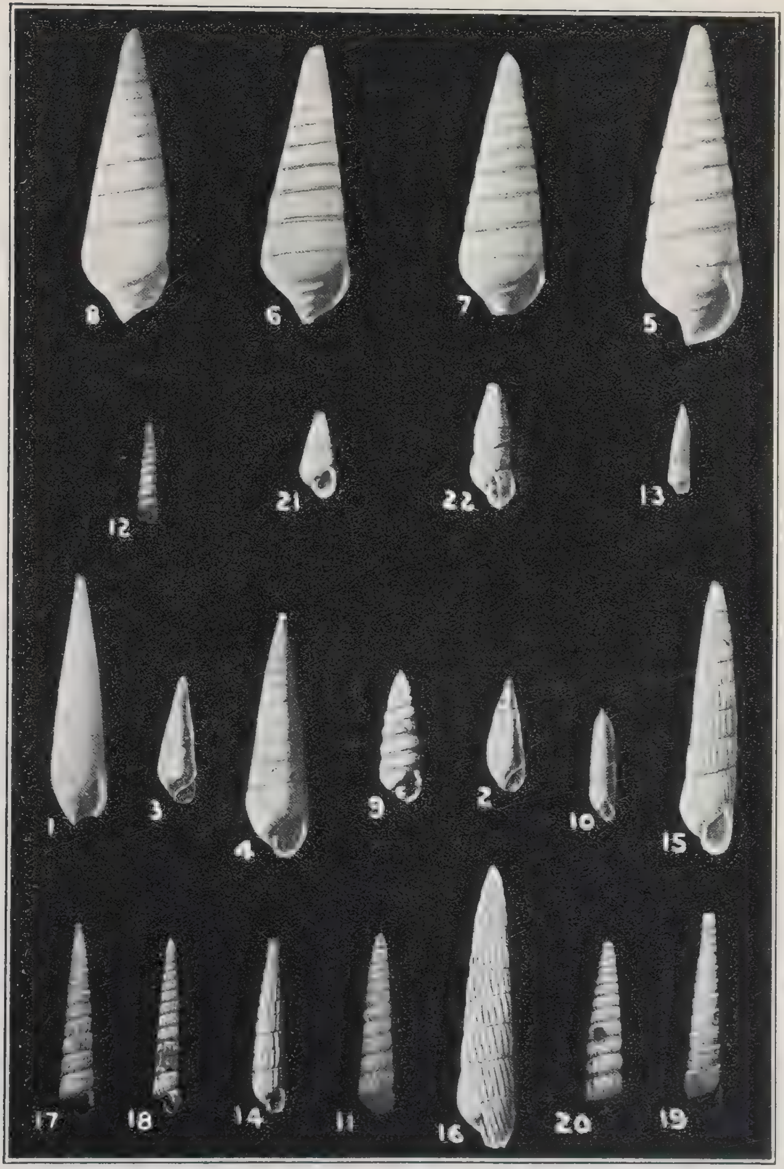
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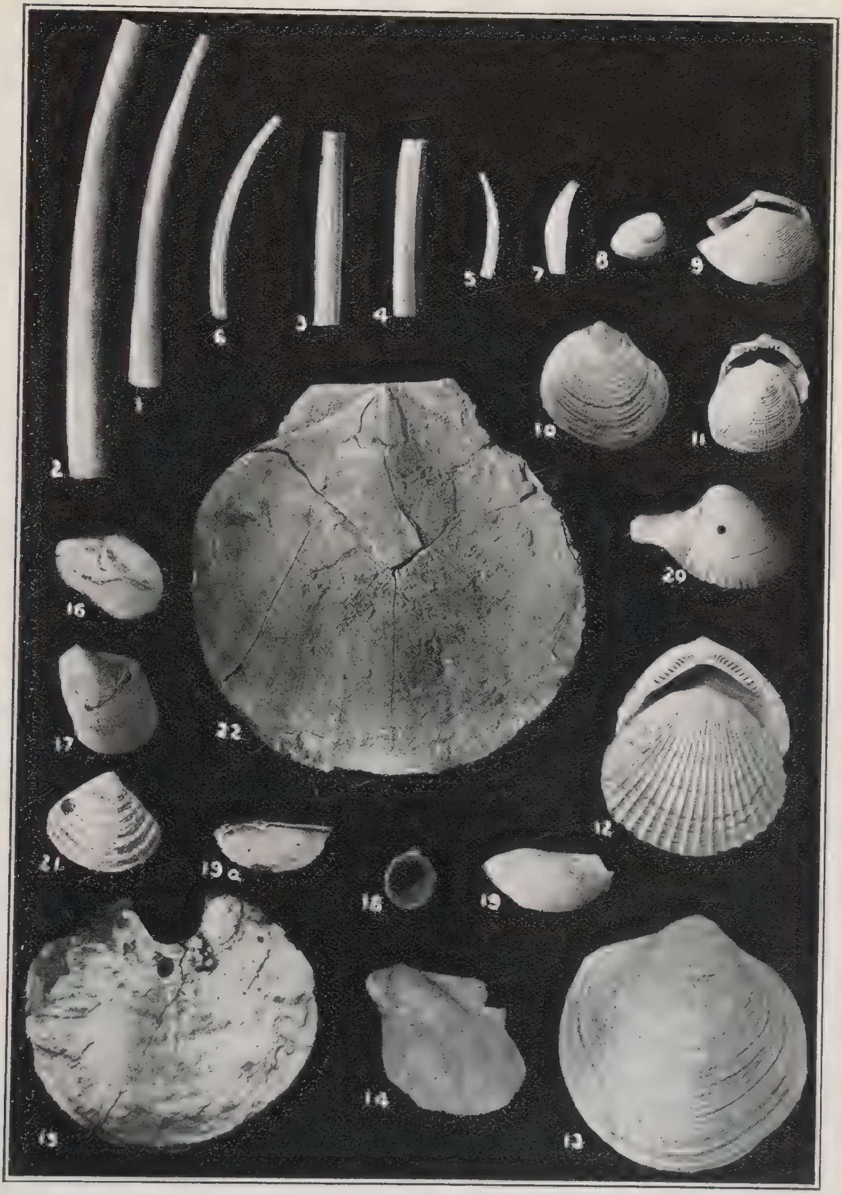
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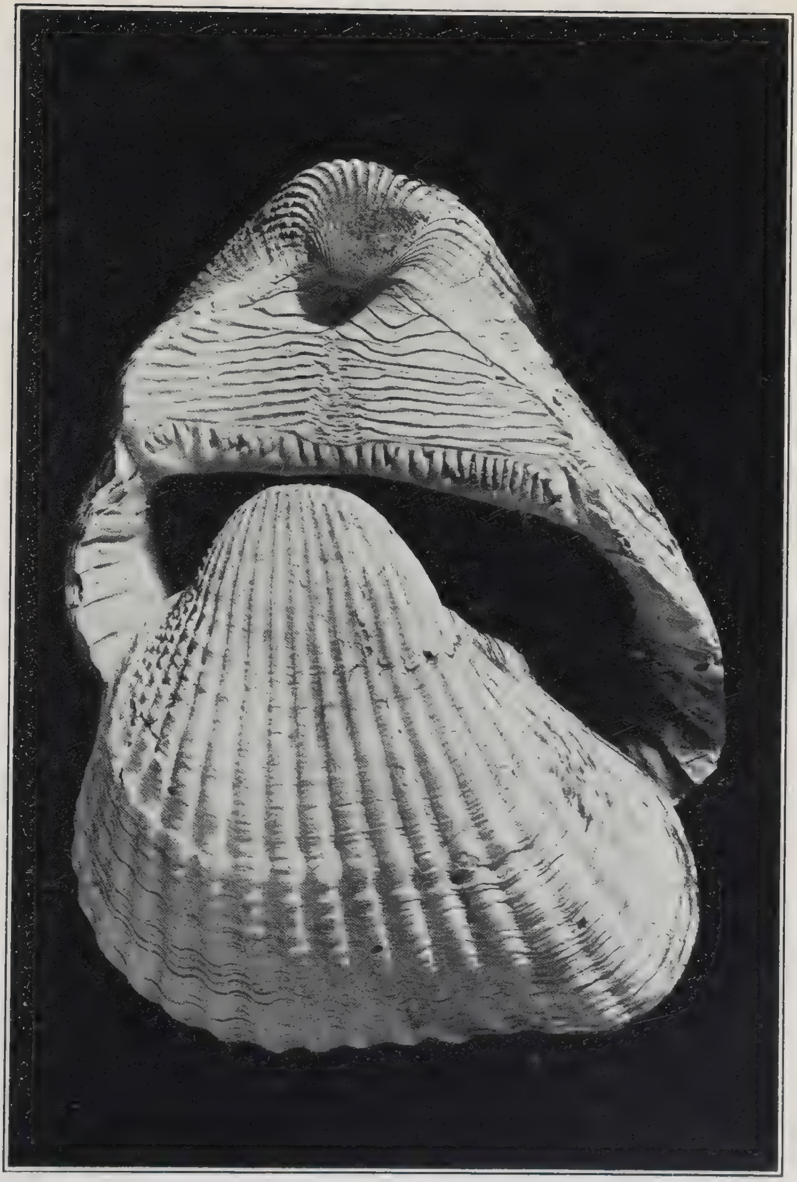

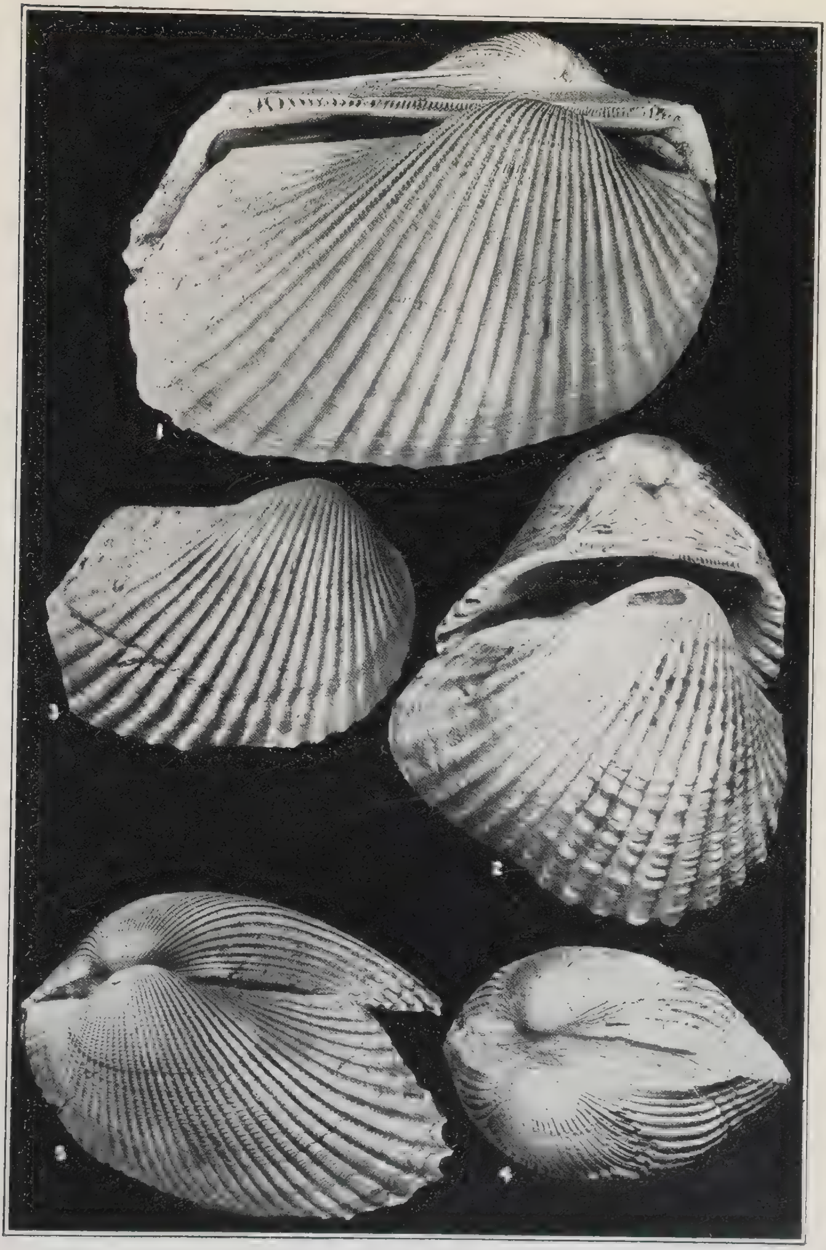
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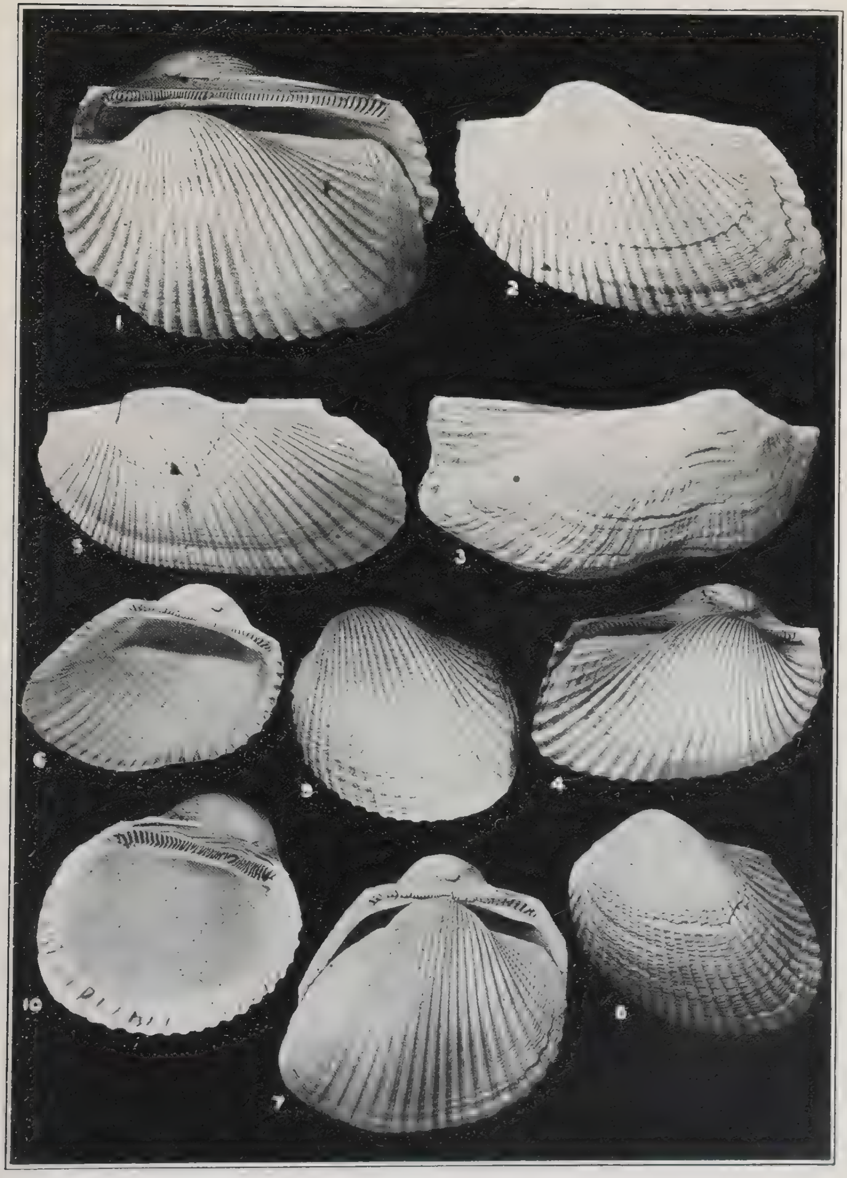
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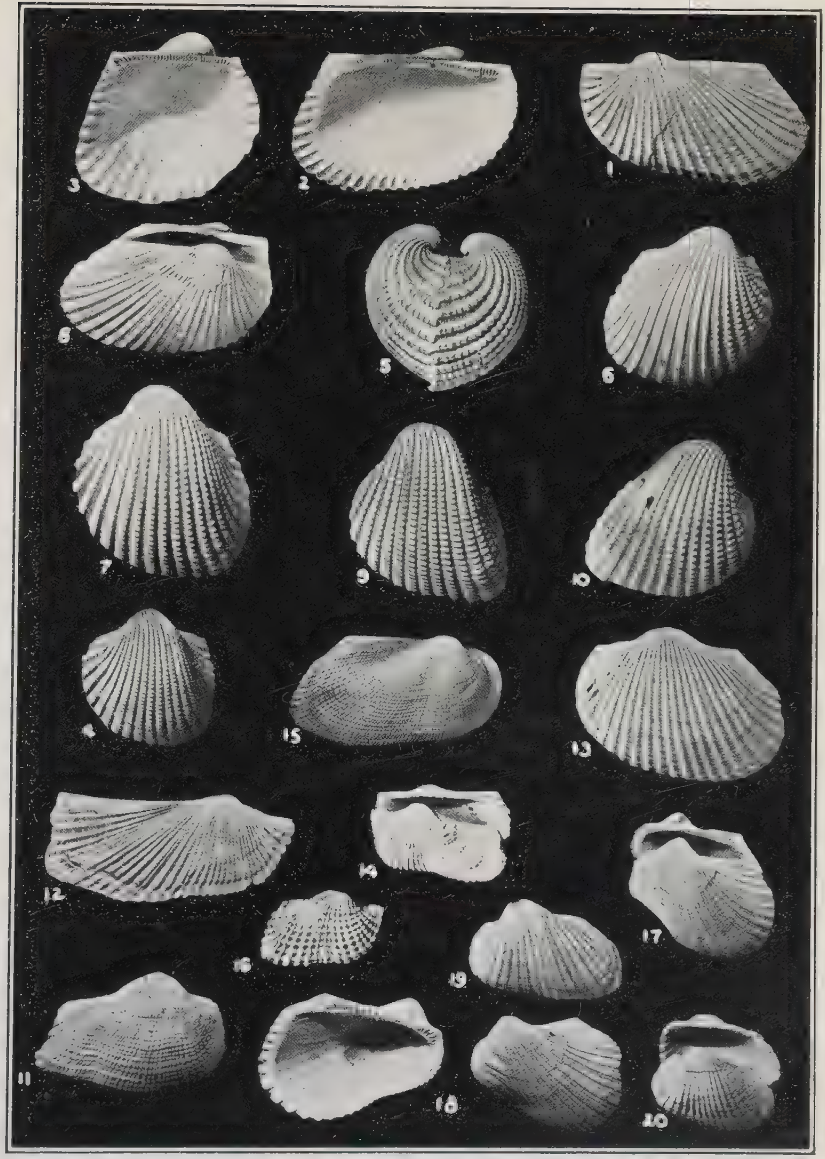
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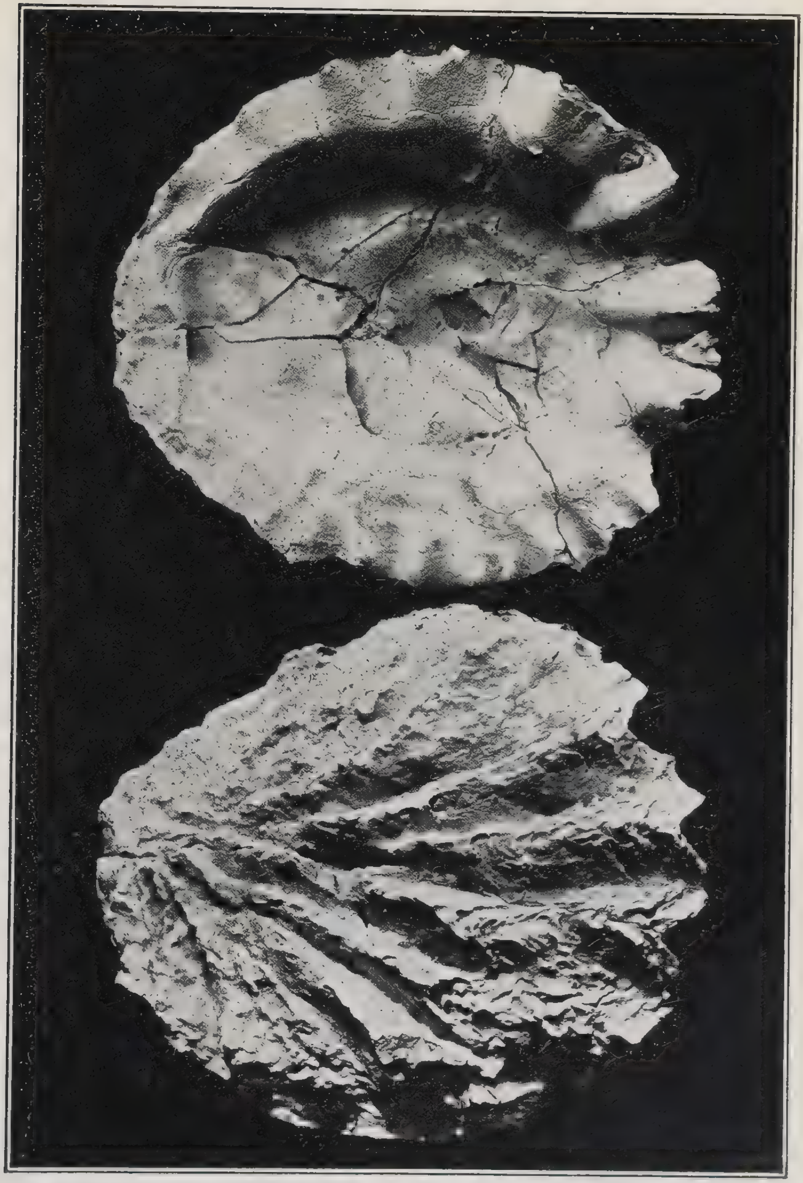

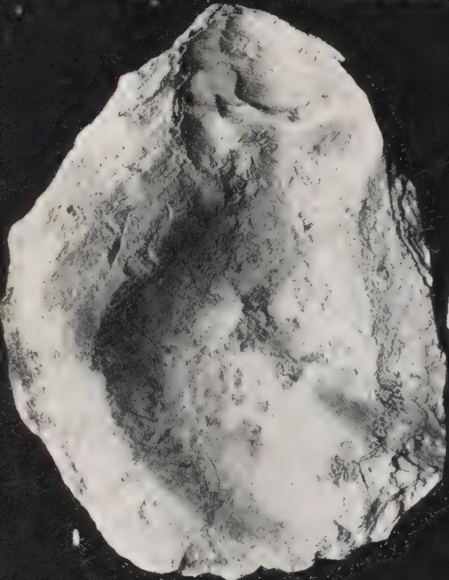
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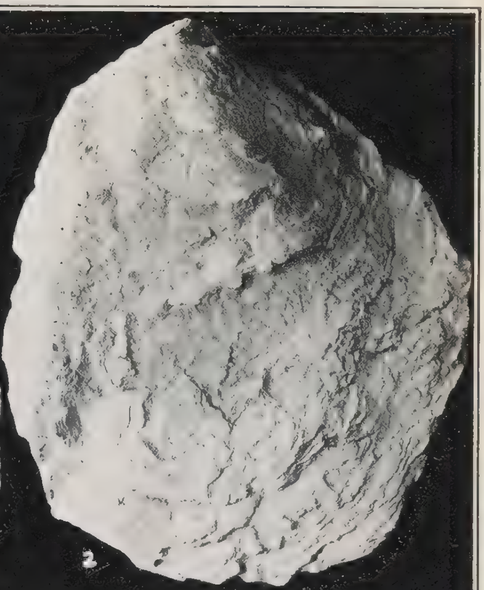
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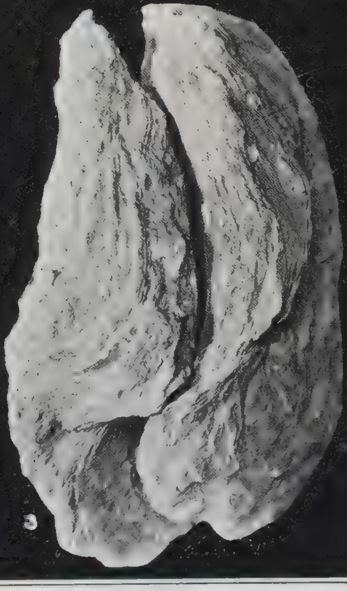
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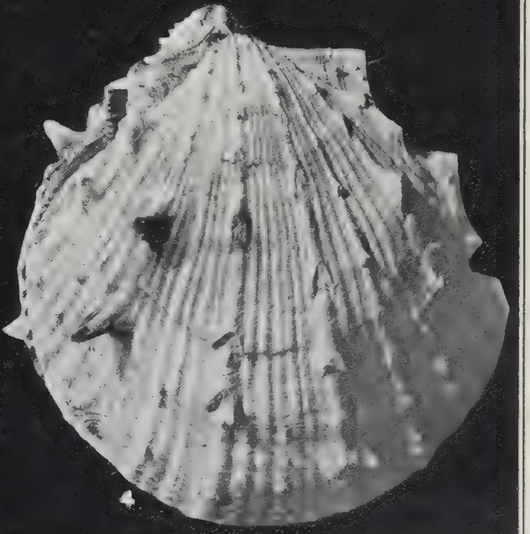
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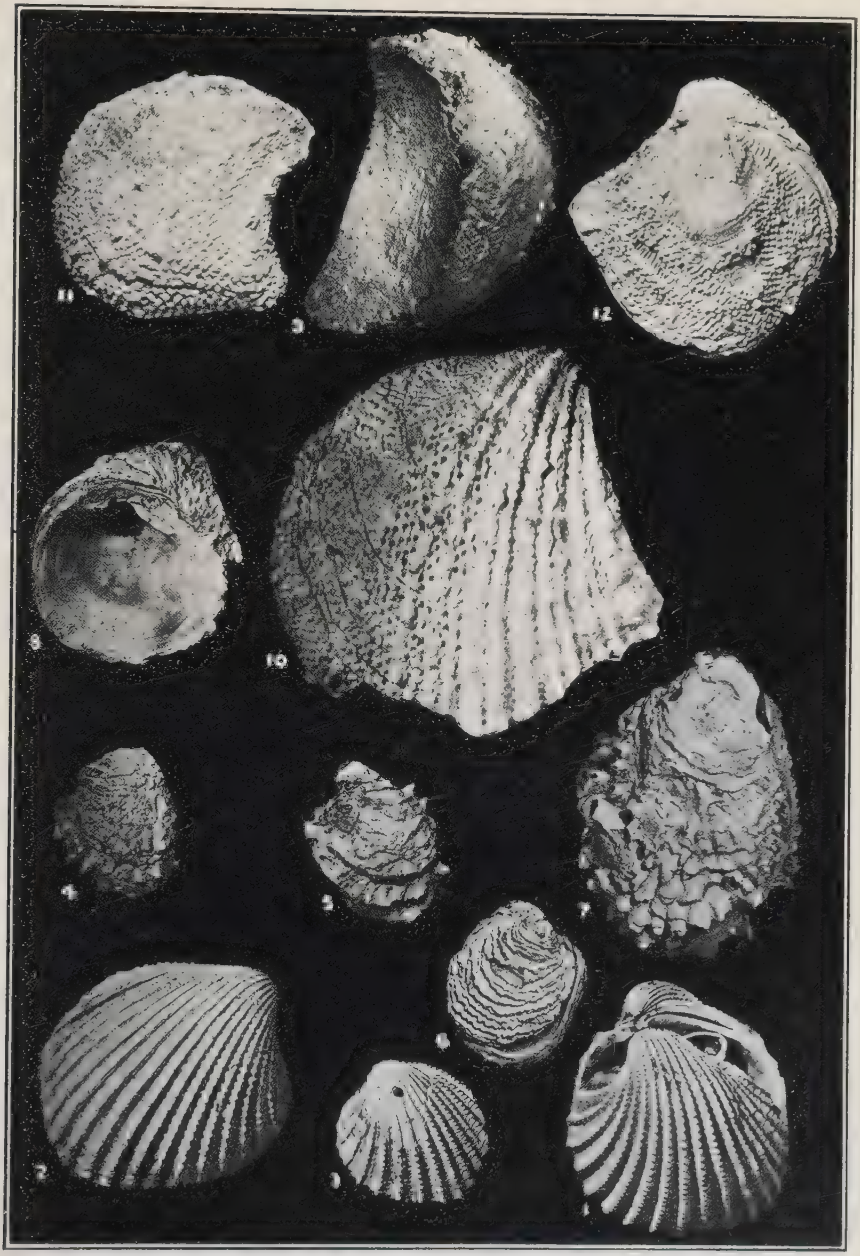
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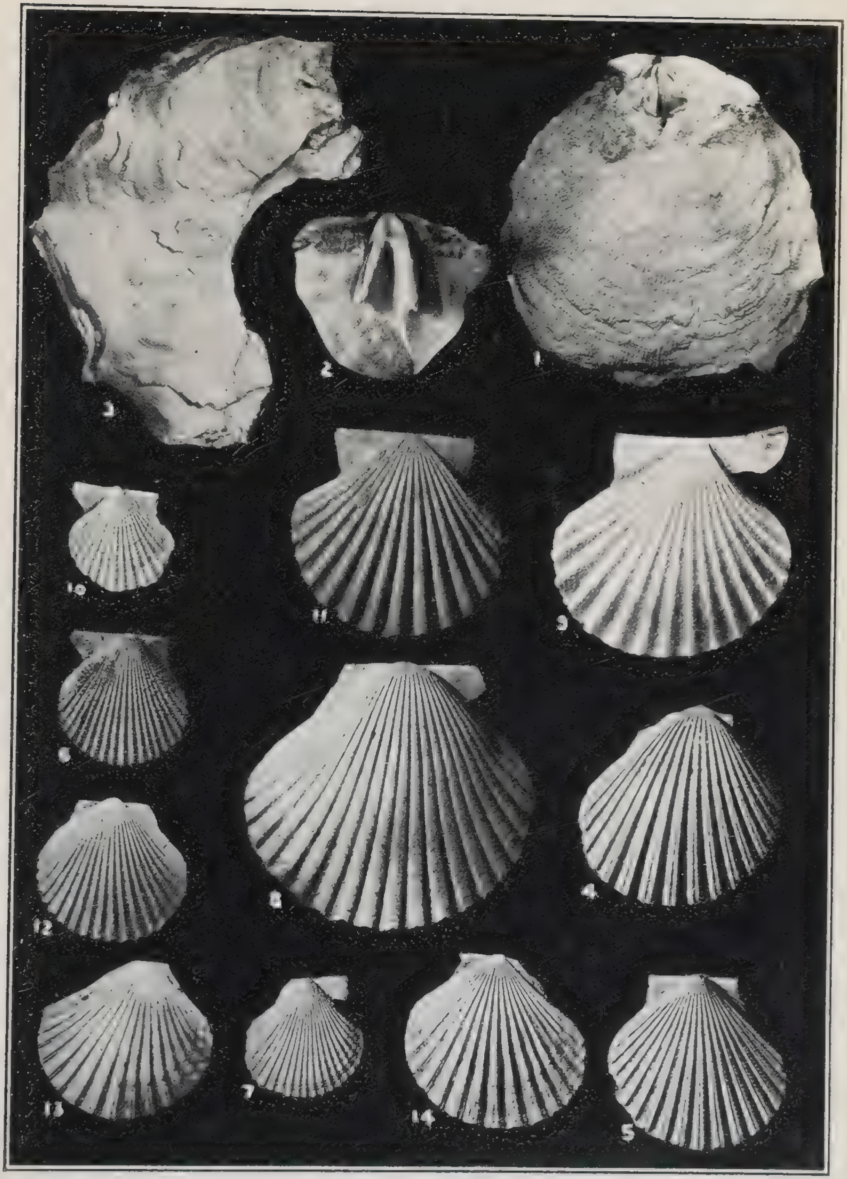
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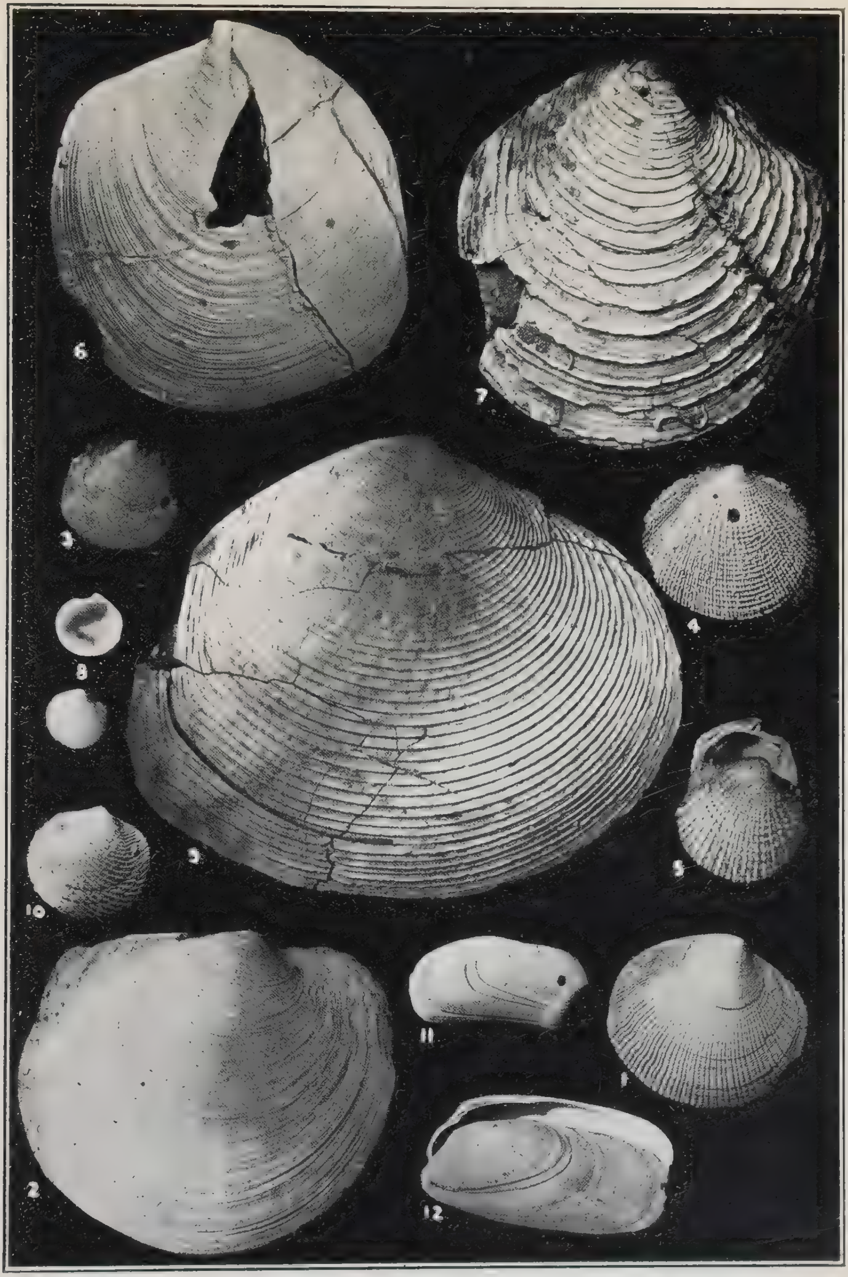
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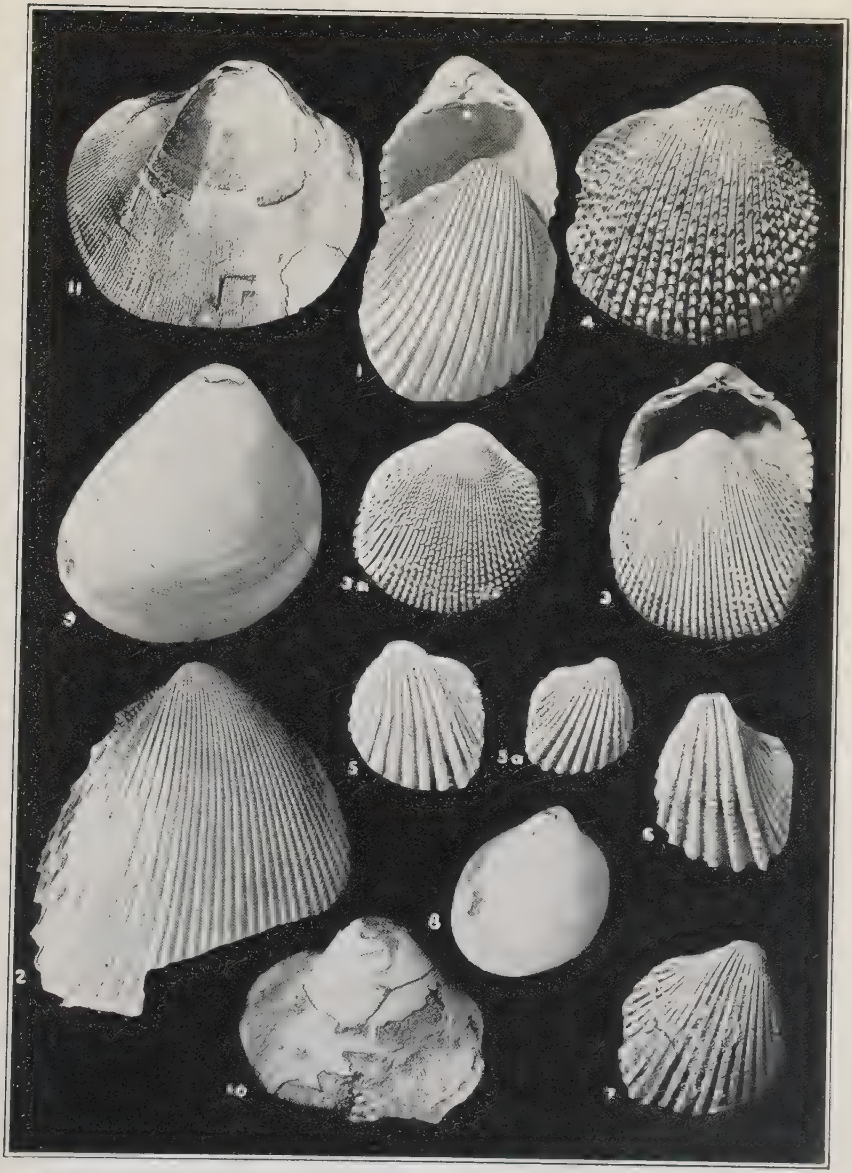
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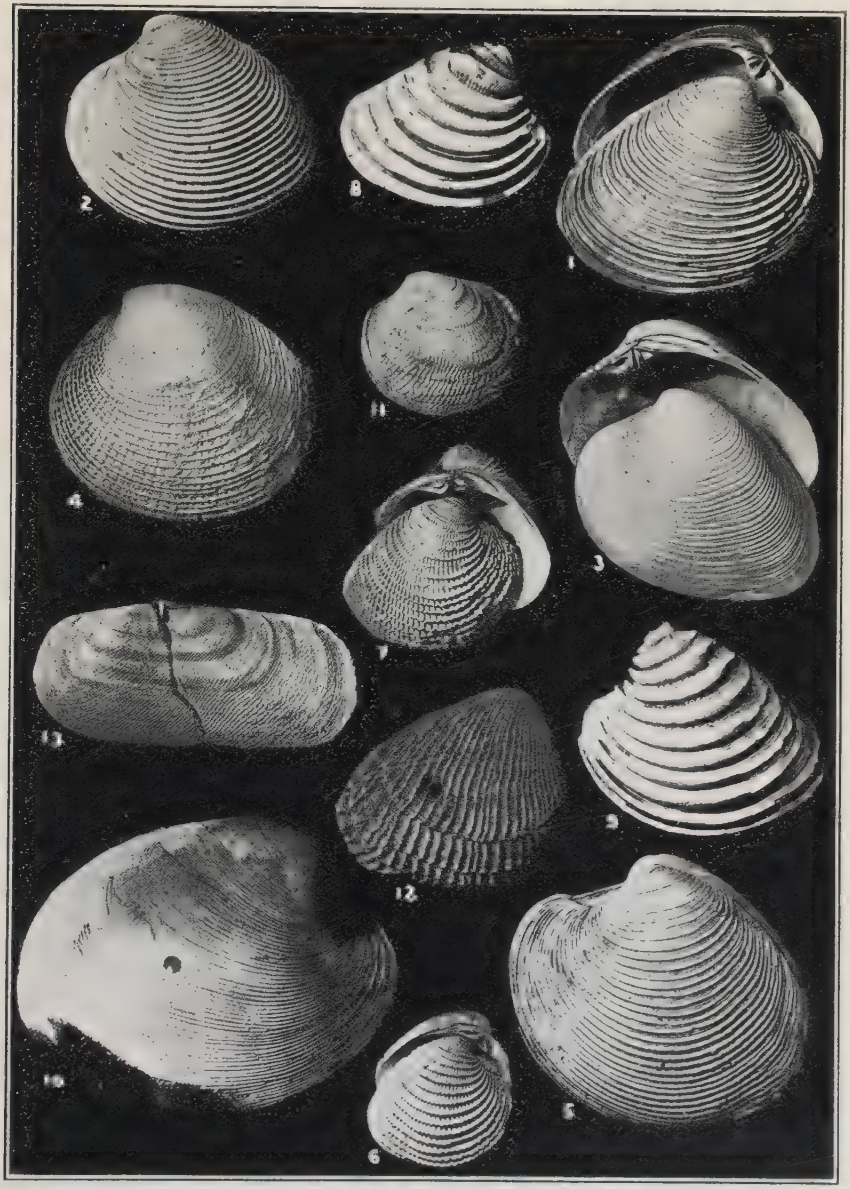
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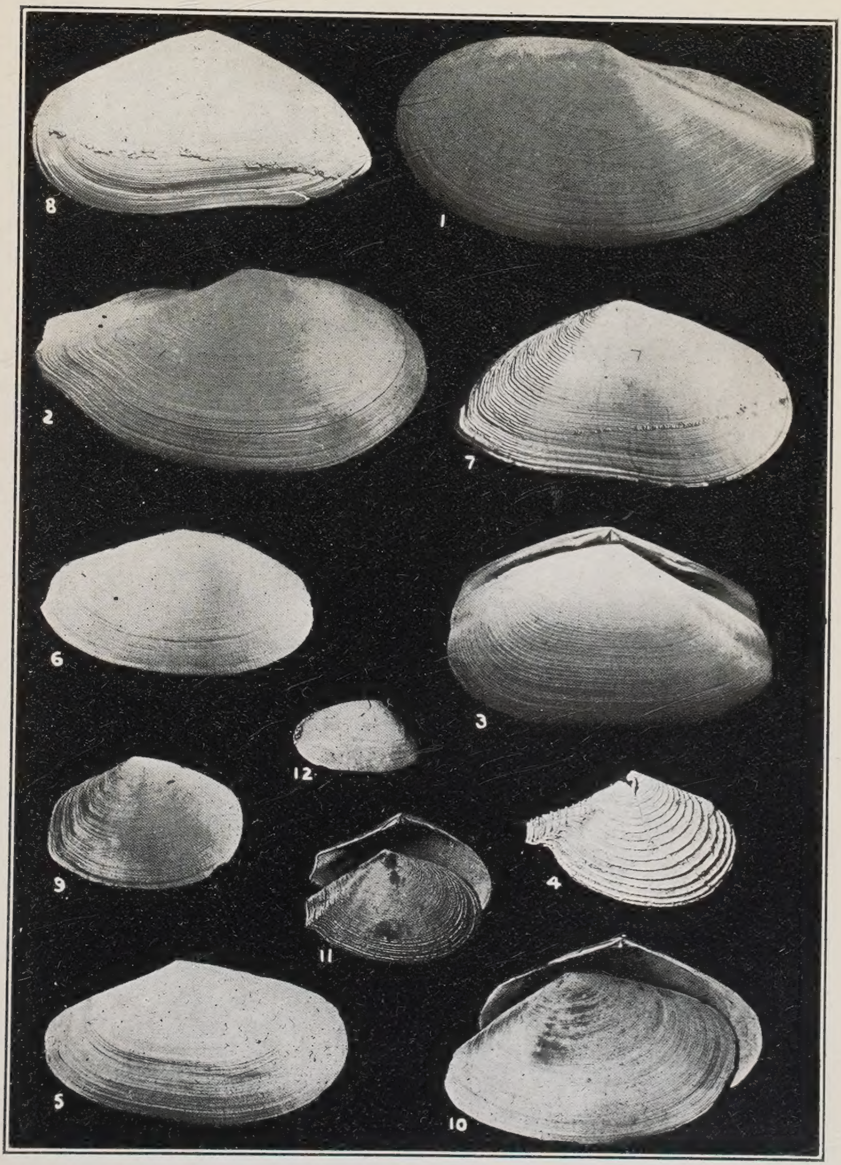
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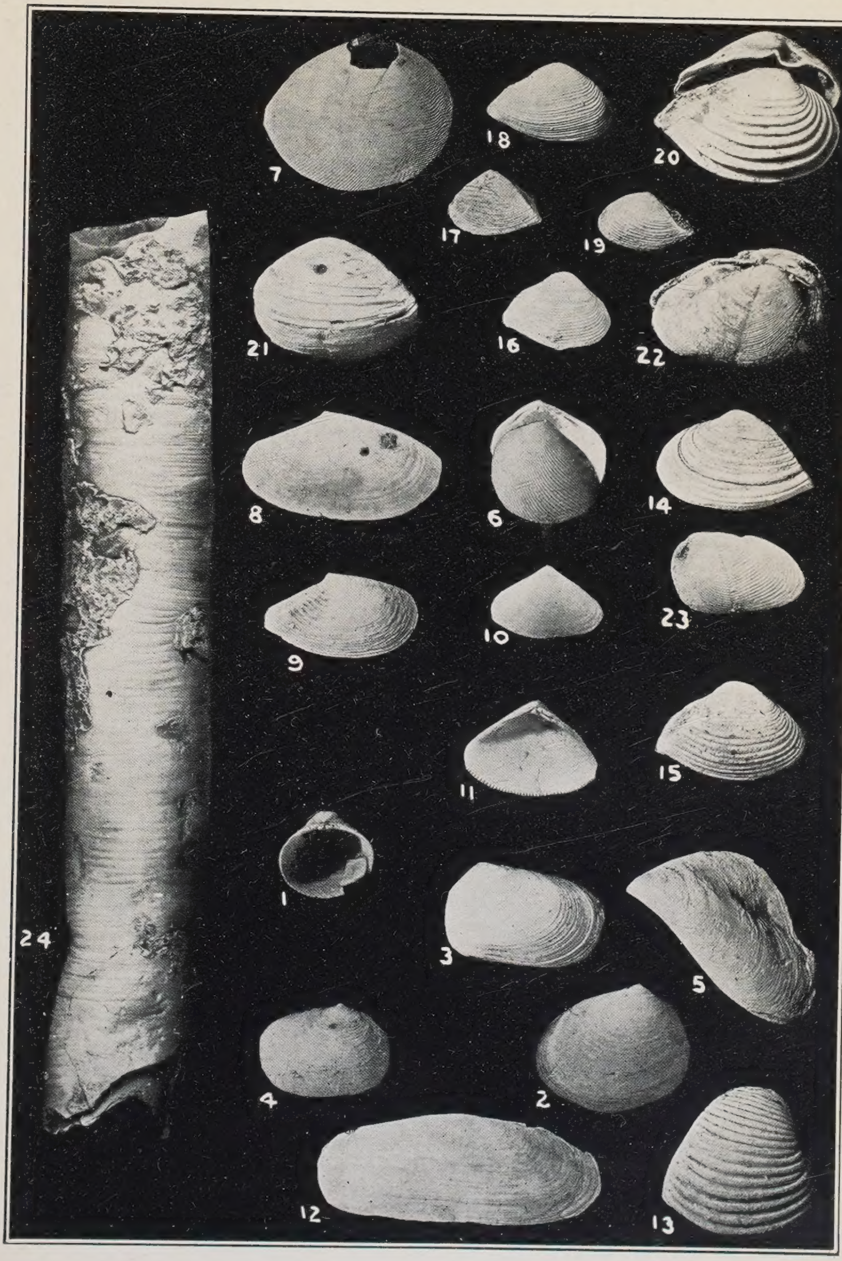
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